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INTERNATIONAL CONFERENCE ON INTERDISCIPLINARY RESEARCH ON ENVIRONMENTAL, SOCIAL, AND GOVERNANCE STRATEGIES FOR THE SUSTAINABLE DEVELOPMENT GOALS

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CIRES 2025



TRANSPORT PUBLISHING HOUSE

HO CHI MINH CITY UNIVERSITY OF ECONOMICS AND FINANCE
SOUTHERN AFFAIRS DEPARTMENT – MINISTRY OF SCIENCE AND TECHNOLOGY

International Conference on Interdisciplinary Research on Environmental, Social, and Governance Strategies for the Sustainable Development Goals

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FOREWORD

In the pursuit of sustainable development and in alignment with the United Nations' Sustainable Development Goals (SDGs), the Ho Chi Minh City University of Economics and Finance (UEF) is honored to host the International Conference on Interdisciplinary Research on Environmental, Social, and Governance Strategies for the Sustainable Development Goals (CIRES 2025). Under the theme "Vietnam's Readiness to Achieve the Sustainable Development Goals", this conference aims to foster interdisciplinary dialogue and collaboration to address pressing global challenges.

CIRES 2025 serves as a platform for scholars, practitioners, and policymakers to exchange insights across various domains, including technology and digital transformation, governance and public policy, culture and education, global issues, and communication. By integrating knowledge from multiple disciplines, the conference seeks to develop comprehensive strategies that promote sustainable development and resilience.

The conference will feature keynote speeches, panel discussions, and paper presentations that delve into topics such as the adoption of AI in higher education, ESG as a catalyst for sustainable enterprises, infrastructure for smart cities, climate adaptation for vulnerable communities, and the role of communication in driving SDGs.

We extend our sincere gratitude to all contributors, keynote speakers, and participants for their commitment to advancing interdisciplinary research and sustainable development. We also acknowledge the support of our co-organizers and sponsors in making this event possible.

We look forward to engaging discussions and fruitful collaborations that will emerge from CIRES 2025, contributing to Vietnam's readiness and collective global efforts toward achieving the Sustainable Development Goals.

Wishing you a successful and inspiring conference.

Sincerely,

ON BEHALF OF THE
ORGANIZING COMMITTEE
CHAIRMAN



Dr. Ngô Minh Hải

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USING GREEN HYDROGEN TO ACHIEVE SUSTAINABLE ECONOMY IN VIETNAM: POTENTIAL AND RECOMMENDED POLICIES

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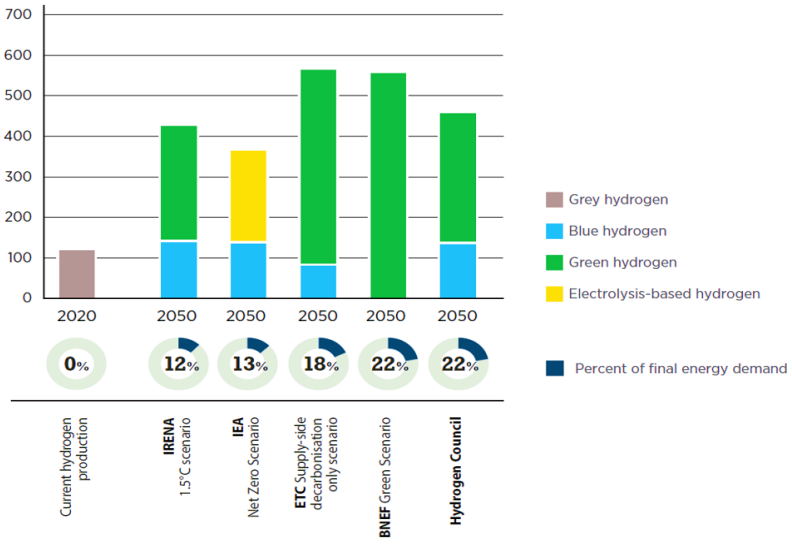
ABSTRACT

In the transition to reach the target of net-zero economy, hydrogen is considered as a vital component with great potential to substitute fossil fuels in various sectors in Vietnam such as transportation, chemical production, agriculture, electricity manufacturing, etc. The application of green hydrogen strategy also generates an effective use of existing national resources as well as guarantees energy security. Despite possessing a rich source to produce green hydrogen, the employment of this source still faces numerous limitations that hinder the evolution of zero-carbon progress. Thus, the study examines the prospect and procedure of green hydrogen manufacture in Vietnam by utilizing wind and solar energy. Moreover, an analysis based on the programs and roadmaps of some countries to develop green hydrogen economy is provided to propose feasible suggestion for policy makers. In general, the application of green hydrogen widely could stimulate a more sustainable economic development.

Keywords: “green hydrogen”, “net-zero target”, “policy makers”, “sustainable development”.

1. INTRODUCTION

The challenge of reducing emission in energy sectors is mainly caused by the world’s heavily dependent on different types of fossil fuels, which added to the enormous volume of carbon dioxide (CO2), specifically in transportation, construction, industrial fields. Thereby, the mission of decarbonization has drawn significant attention, consistent with the aim of Pais Agreement as attaining a neutral climate society by 2050. In fact, numerous nations have already advocated the employment of renewable energy technologies, which could lead to a net-zero outlook. Within this context, hydrogen can act as a bridge to fill the gap in the attempt of lowering CO2 since this resource being considered as a non-emissive energy, which could be resulted in a green hydrogen economy. However, to reach the ambitiousness of carbon-neutral, nearly 600 million tons of hydrogen (or 10 times compared to the current hydrogen capacity) need to be generated in 2050 (Figure 1) (Hydrogen Council, 2024).



Source: IRENA, 2022

Figure 1: Global hydrogen demand in 2050 (million tons)

The hydrogen economy is believed to alleviate the negative influences of global warming and support the prospect for decarbonization in various sectors. As it shown in figure 1.1, the proportion of hydrogen in energy demand are expected to range from about 12% to more than 20% with the increasing use of green hydrogen in 2050. Previous research

has shown that hydrogen was mainly employed to generate value-added products in methanol, ammonia, gas liquid fuels. Nevertheless, with the purpose of lessening CO2, green hydrogen is recognized as an effective alteration since this source is identified as an environmentally friendly energy transporter. The potential of green hydrogen in producing a virtuous cycle in renewable electricity production, presenting positive outcomes in terms of not only capability parameter of the manufacturing area but also the stability of electricity grid (Capurso et al., 2021). In other words, green hydrogen has a crucial function in the practicality of renewable energy for a long-term. Additionally, as stated by Trattner et al. (2022), the approach to solve environmental concerns and climate change was performing two primary paradigms, containing alternative resources and a green hydrogen culture.

Within national portfolio for various industries and available energy sources, Vietnam has been firmly committed to decrease CO2 emissions and improve air quality by decarbonizing in multiple industrial fields. Furthermore, following the country developing schemes, Vietnam puts substantial effort to invest in alternative energy market as well as enlarge the percentage of renewable resources in the total used of existing energy.

As a matter of fact, Vietnam is regarded as a country with a rich variety of renewable sources like solar, wind, biomass, etc., which can be exploited to generate green hydrogen. Along with the worldwide energy transition movement, Vietnamese government adopts hydrogen as an approach to boost the use of clean energy as mentioned in National Development Plan, hence, opening an opportunity for hydrogen market growth. Regardless of abundant advantages, developing a green hydrogen economy requires to deal with numerous obstacles, including regulation legislation, hydrogen storage, cost, standards, safety, etc. Thereby, this paper investigates the ability of current renewable energy sources in generating hydrogen in Vietnam and the experiences from several nations, then propose suggestions for preparing policy frames as well as action plans related to cultivating green hydrogen. 2.

2. METHODS

This study employs analysis and synthesis approach from collecting relevant data and national documents as well as academic research. The collected articles are focus on the role of green hydrogen in the transition to cleaner energy sources, the assessment of green hydrogen potential in Vietnam, the government orientation regarding energy development plan as well as the capacity of existing resources for green hydrogen production. By reviewing these related sources, author provides an assessment regarding the potential of green hydrogen in Vietnam and recommend feasible strategy and policy for developing low carbon economy in the future.

3. RESULT AND DISCUSSION

3.1. Green hydrogen potential in Vietnam

Currently, multiple projects are operated around the world to create green hydrogen employing alternative sources such as power from solar and wind. As mentioned by Kumar and Lim (2022), most of hydrogen (about 95%) was generated from fossil fuels sources, specifically through stem restructuring natural gas, releasing more than 800 million tons CO2 each year, whereas other renewable sources, for instance water electrolysis generate the remaining of 4%.

Vietnam possesses a rich resource of clean energy, containing solar, wind, geothermal, biomass and hydroelectricity, which can be exploited to produce green hydrogen (Nguyen et al., 2021). With the current tendency of generating green hydrogen through water electrolysis, solar as well as wind are considered being possible sources to produce green hydrogen in Vietnam (Nasser et al., 2022). As acknowledged by GIZ Vietnam (2022), the potential production of green hydrogen is predicted about more than 38,000 kilotons from solar energy and above 1,600 kilotons from onshore wind. The below tables have shown that the anticipated annual green hydrogen generated from solar energy is nearly 23,000 kilotons with the average cost of production at about 3.5 US$ per kg in 2030 and 1.2 US$ per kg in 2050. In terms of using onshore wind, the amount of green hydrogen can be manufactured is over 650 kilotons at the price of 3.6 US$ and 1.3 US$ in 2030 and 2050 respectively.

Table 1.1: Projected green hydrogen potential from solar energy

Capacity factor	Area (km2)	Capacity (MW)	Annual energy (MWh)	Green hydrogen potential (ton)	Cost of green hydrogen in 2030 (US$/kg)	Cost of green hydrogen in 2050 (US$/kg)
Below 12.5%	329	790	864,678	15,441	Above 5.14	Above 1.85
12.5 - 14.2%	25530	61,273	76,218,302	1,361,041	5.14 - 4 54	1.85 - 1.63
14.2 - 15.8%	82765	198,635	274,926,734	4,909,406	4.54 - 4.06	1.63 - 1.46
15.8 - 17.5%	59101	141,843	217,445,968	3,882,964	4.06 - 3.67	1.46 - 1.32
17.5 - 19.2%	24554	58,929	99,114,276	1,769,898	3.67 - 3.35	1.32 - 1.21
19.2 - 20.8%	78744	188,987	344,348,620	6,149,082	3.35 - 3.09	1.21 - 1.11
20.8 - 22.5%	51726	124,143	244,685,815	4,369,390	3.09 - 2.84	1.11 - 1.03
Above 22.5%	5189	12,454	27,274,395	487,043	Below 2.84	Below 1.03
	327,939	**787,054**	**1,284,878,789**	**22,944,264**	**Average: 3.45**	**Average: 1.24**

Table 1.2: Projected green hydrogen potential from onshore wind

Capacity factor	Area (km2)	Capacity (MW)	Annual energy (MWh)	Green hydrogen potential (ton)	Cost of green hydrogen in 2030 (US$/kg)	Cost of green hydrogen in 2050 (US$/kg)
Below 25%	252,572	11,618	25,444,113	454,359	Above 3.97	Above 1.42
25 - 30%	29,935	1,377	3,618,725	64,620	3.97 - 3.31	1 .42 - 1.19
30 - 35%	17,953	826	2,532,046	45,215	3.31 - 2.84	1.19 - 1.02
35 - 40%	12,044	554	1,941,277	34,666	2.84 - 2.61	1.02 - 0.93
40 – 45%	8,175	376	1,482,404	26,471	2.61 - 2.32	0.93 - 0.83
45 - 50%	4,139	190	833,954	14,892	2.32 - 2.09	0.83 - 0.75
Above 50%	3,121	144	691,725	12,352	Below 2.09	Below 0.75
	327,939	**15,085**	**36,544,244**	**652,576**	**Average: 3.60**	**Average: 1.30**

Source: GIZ Vietnam, 2022

The sum of solar radiation in Vietnam per day is around 5kWh/m2 on average in the areas of southern and central Vietnam, and about 4kWh/m2 in northern provinces. Additionally, sunshine hours amount is measured in the north is approximately 1500-1700 hours per year, while that of south and central cities is about 2000-2600 hours (Association Vietnam Energy, 2020). In terms of wind, Vietnam has greatest potential in Southeast Asia with the capacity of about 513,360 MW, which is over 10 times compared to the expected capability of electricity sector in Vietnam by 2020 (Asia Wind Energy Association, 2022). To be more specific, the potential of wind is perceived to achieve a great level in coastal regions such as Vung Tau, Ninh Thuan, with a speed of about 10 m/s on average and the density yearly of 500 W/m2 to 700 W/m2 (Asia Wind Energy Association, 2022). Within the significant capability of sources from wind and solar, green hydrogen manufacturing is highly promising in Vietnam. As cited by Phap et al. (2022), the hybrid power scheme established Binh Thuan, Can Tho, Quang Nam near industrial zones could create about 17 tons of green hydrogen subjected to the solar energy amount in these areas. Therefore, utilizing solar and wind resources for manufacturing green hydrogen is a cost-effective approach to address the growing need for hydrogen in Vietnam.

According to National Energy Master Plan for period 2021-2030 and vision to 2050, the government approved the progress for prioritized investment in green hydrogen production throughout the country with the expected capacity

reaching more than 1,000 tons/year for period 2031-2050 as represented in the following table.

Table 1.3: Green Hydrogen Production Projects

No.	Project name	Estimated capacity (1.000 tons/year)	Period
1	Northern Region Hydro production Plant	100-200	2021 - 2030
		1.000-6.000	2031 - 2050
2	Middle Region Hydro Production Plant	200 - 400	2021 - 2030
		3.000- 12.000	2031 - 2050
3	Southern Region Hydro Production Plant	200 - 400	2021 - 2030
		3.000- 12.000	2031 - 2050

Source: Vietnam National Energy Master Plan, 2023

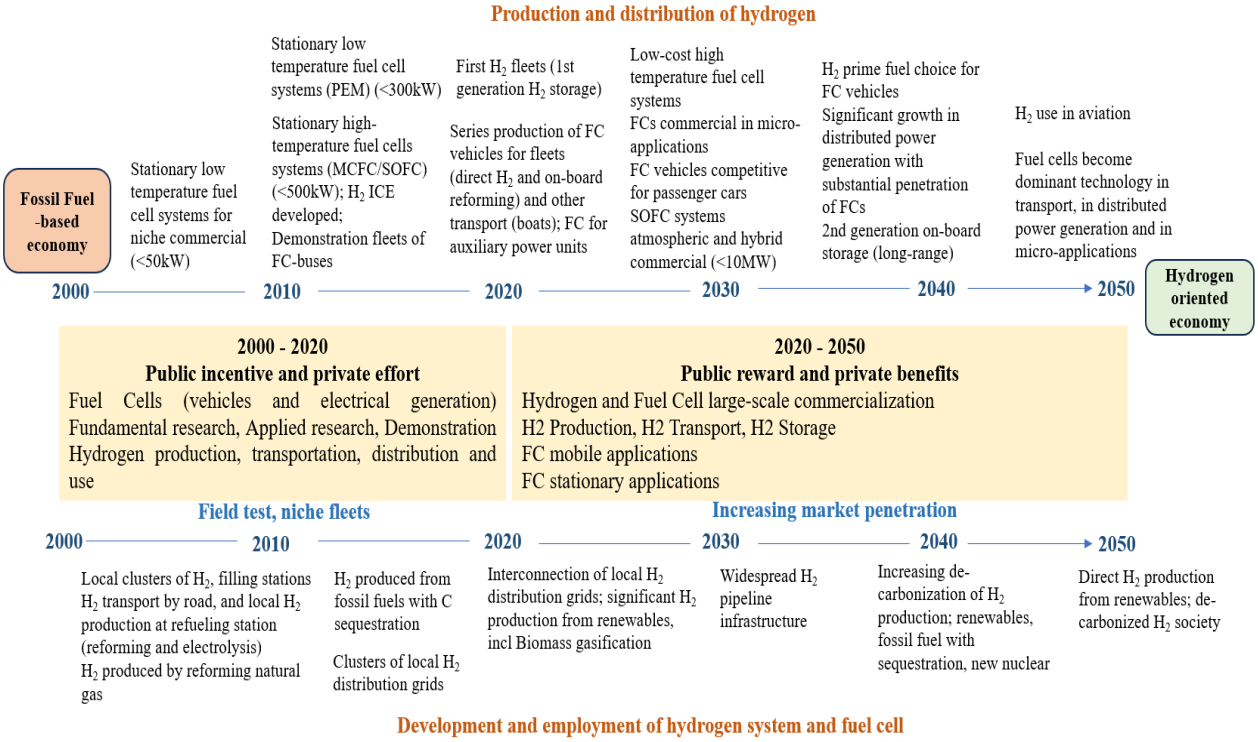
3.2. Strategy to develop green hydrogen economy in some regions

In 2020, the plan for green hydrogen improvement was introduced by seven developers with the purpose to boost the scale of this source generation up to 40-50 times before 2026 (Coleman, 2021). Forecasting by OECD, the worldwide market for green hydrogen would increase at an exponential rate, attaining $10-11$ billion in 2030 and green hydrogen would reach nearly 25% of the international energy requirement in 2050.

In 2019, a Green Package was approved with the value of trillion dollars in Europe gained a highly attention from investors towards green hydrogen. Europe then released a strategic roadmap in 2020 for exploiting hydrogen resources, which was expected to rise from under 3% to around 15% in 2050. As illustrated in Figure 2, the roadmap for fuel cells and hydrogen revolution in European is divided into two sections, consisting of “Development and employment of hydrogen system and fuel cell” and “Production and distribution of hydrogen”. The Europe target was to reduce the amount of CO2 released in the existing hydrogen manufacture by 2025 and integrate hydrogen into multiple industrial fields along with transportation sector. It is anticipated that within five years, hydrogen could turn into a crucial element of renewable sources, particularly in the sectors of steel and transport. The EU aims to reach closely 50 GW of electrolyzes creating green hydrogen in 2030 and water electrolysis would be the only approach to apply on a large scale, even though there are numerous difficulties for promoting the efficiency of producing this energy (Al-Qahtani et al., 2020).

China has been recognized as an active participant in Asia regarding renewable hydrogen economy since they revealed a low-priced technology in practice that transformed methanol to create hydrogen (Ren et al., 2020). Another strategy was about combining fuel-cells technique and fossil fuel hydrogen, as well as improved the generation of hydrogen for motor usages. Related to the policies of long-term energy development, China established a proposal for an extensive application of hydrogen and invested substantially on this energy investigation and research. China officially released the plan in 2022 for an advanced energy scheme to enhance the attempts of decarbonization in 2025 with a highlighting on hydrogen energy (Alexander, 2022). Moreover, this country also established a proposal of making more hydrogen refueling stations to reach an objective of 50,000 vehicles using hydrogen fuel-cell vehicles in 2025.

In United States, more than $150 million was spent to encourage research for essential technologies for green hydrogen economy (Pingkuo and Xue, 2022). Additionally, Department of Transportation in US established a competitive package to carry out tactically available vehicles utilizing electrical charger and hydrogen fueling setup on numerous highway and street in the public. Another policy was applied is related to tax credit, for instance, renewable fuel liquefied hydrogen was eligible for $0.5 per gallon. Besides, the US Department of Energy goal is lessening green hydrogen cost by 80% to $1/kg in ten years. Moreover, the proposal called Hubs of Clean Hydrogen, comprised the funding of $7 billion are supported with an aim to generate six to ten green hydrogen centers around the country.



Source: European Commission

Figure 2: European roadmap for hydrogen and fuel-cells

3.4. Vietnam recommended policy for developing green hydrogen production

Vietnam has been in the progress of taking initial phases with regards to the transition of renewable energy, altering from traditional resources to more environmentally friendly energy, in which the green hydrogen enlargement is a critical goal in the future. The energy requirement in Vietnam is projected to be about 150-180 million tons of oil, and hydrogen covers around 5.6-6.2% in 2050 (Tri, 2023). The green hydrogen utilization in a rich variety of industries could support to cut down approximately 325 million tons CO2 until 2045, thus the net-zero target is closely can be reached, particularly for energy field.

To attaining the goal of green hydrogen improvement, in 2020, Vietnamese government issued the strategy for National Energy Development with the orientation till 2030, and a 2045 vision and introduced a top-priority technologies, including hydrogen sources by 2050 (Cuong et al., 2021). Furthermore, the National Energy Plan aim to approach about 25.5 million tons in hydrogen production, and fuel origination from hydrogen would achieve 2.5-2.9 million tons (Tri, 2023). Consequently, hydrogen fuels could be used in electricity manufacture, heavy industry, transportation, buildings for commercial purposes to enhance the energy conversion progress and step by step decarbonize the whole economy. In addition, a rise in carbon tax is recognized as an effective resolution to attain a greener business environment. Based on the experience of EU, the tax for CO2 releasing should be climbed up to 2,55 million VND per ton CO2 to reach the price of green hydrogen approximately 17,850-25,500 VND/kg. The suggested roadmap regarding green hydrogen growth for Vietnam is presented in the below table, containing two main Phases: Phase 1 (2020-2030) small size projects should be encouraged with the capacity of 20,000-25,000 tons; Phase 2 (2031-2050), hydrogen would be generated by employing coal gasification and renewable electricity technology.

Based on the above analysis, this study suggests several policies to encourage the manufacture of green hydrogen (Figure 3) as follow:

For the period 2025-2030, it is essential to incorporate green hydrogen into energy transformation strategy to establish a legal scheme. Besides, the government need to set up regulations for managing green hydrogen development initiatives being consistent with the scope and requirement of energy sector. Additionally, assessing the green hydrogen demand to project the required amount for production should be implemented. Moreover, developing human resources with essential skills and foster public awareness regarding green hydrogen also need to be considered.

For the period 2031-2040, it is crucial to arrange specific proposal for transporting and storing infrastructure, considering requirements and mechanism for the growth of green hydrogen. To be more specific, building a list for top prioritize projects and relevant sectors to develop green hydrogen is necessary for this stage. In addition, executing policies with regards to preferential tax for firms manufacturing green hydrogen should be considered to encourage the participation in this field.

For the period 2041-2050, it should be concentrated on creating financial assistance for projects serving green hydrogen improvement and infrastructure as well as providing tax incentives for hydrogen fuel-cell vehicles users and producers. Furthermore, it is vital for imposing CO2 tax for the usage of fossil fuels, hence green hydrogen could compete with other conventional sources.

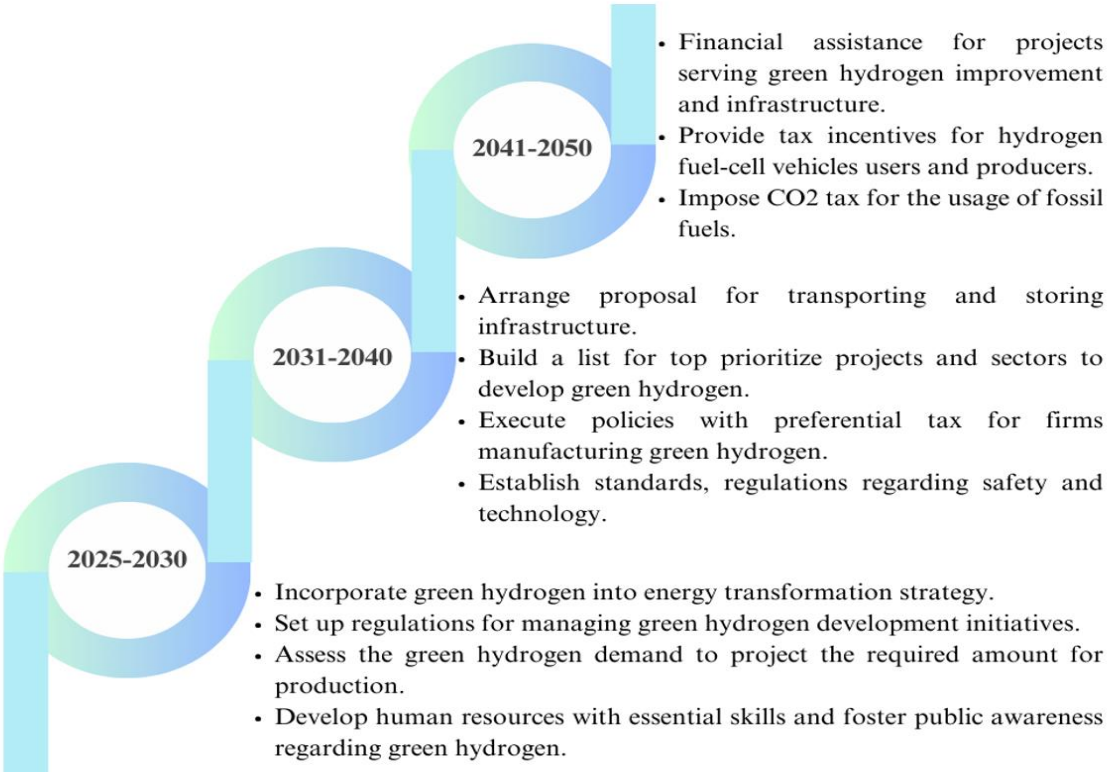


Figure 3: Recommended policy for developing green hydrogen production

4. CONCLUSION

Green hydrogen development is the key processes in enhancing energy supply and security as well as support the goal of zero-emission. Producing green hydrogen from renewable sources could be efficiently substitutes traditional sources and pave the way for sustainable growth. As a role of a environmentally friendly energy, green hydrogen could relieve challenges correlated to conventional resources, comprising climate change, environmental pollution, energy safety, etc. This paper's intention is highlighting the great promising of green hydrogen in Vietnam and proposed plan for the transition of this energy in the long term. The generation of electricity via renewable source and using the method of electrolyzing water to create green hydrogen is considered as a significant cost-effective approach. Nevertheless, there are multiple factors that should be considered such as investment terms and conditions, technology, and engineering features to minimize the negative influences. To build up an effective green hydrogen strategy, government need to establish sensible policies such as the subsidies for related research, as well as for green hydrogen manufacturers and users. It is suggested that the public acceptance at fairly low level regarding new energy safety and financial issues must be solved prior to conducting green hydrogen source on a large scale. For this reason, Vietnam would search for a balance between current economy situation and the green hydrogen ones.

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APPLICATION OF DIGITAL TECHNOLOGY IN SUSTAINABLE MARINE ECONOMIC DEVELOPMENT IN VIETNAM

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ABSTRACT

In the era of the 4th Industrial Revolution, advancements in science and technology, new production, business models, and trends in product/services consumption have provided Vietnam with additional potential to foster sustainable marine economic development. This is essential to maximize the extensive economic potential of the country's seas. To achieve this, Vietnam needs to harness the potential of digital transformation and accelerate this process, applying it to sustainable marine economic development. Digital transformation in marine economic development not only helps to leverage the inherent strengths of this sector but also increases production efficiency, enhances product quality, and enables the economy to keep pace with global scientific and technological advancements, seizing global trends. This paper focuses on analyzing the current conditions for marine economic development in Vietnam and the potential application of digital transformation in marine economic development. From there, it identifies challenges and proposes solutions for the digital transformation process in the sustainable development of Vietnam's marine economy.

Keywords: "Digital transformation", "marine economy", "sustainable development".

1. INTRODUCTION

As a coastal nation with 28 provinces and cities bordering the sea and over 50% of the population living in coastal areas, Vietnam has gradually developed a Marine Strategy by 2020 and a sustainable marine economic development strategy up to 2030 with a vision to 2045. This includes planning for the development of island systems, coastal areas, and economic zones, along with many national-level scientific projects investigating marine resources and developing socio-economic models for coastal zones. However, exploiting the potential and strengths of the country's marine economy still faces certain limitations. There have not been many breakthrough solutions to develop a truly modern marine economy that aligns with its inherent potential and strengths. Many theoretical issues related to sustainable marine economic development, keeping pace with global scientific and technological advancements, and seizing global trends have not been thoroughly studied. With the strong development of digital technology, the application of advanced technologies such as IoT, Big Data and artificial intelligence (AI) in the marine economy opens up opportunities to optimize economic activities and protect marine resources. This article will explore the specific applications of art technology in the main marine economic sectors in Vietnam, and analyze the basis and techniques in developing and deploying this technology to provide sustainable development

2. CONTENT

2.1. Overview of Research Issues

2.1.1 Marine Economy and Sustainable Marine Economic Development

A study by Ecorys (2012) defines the marine economy as an economy that encompasses all economic activities, sectors, and intersectoral activities related to oceans, seas, and coastal regions. This definition also includes activities that directly or indirectly support the operations of marine economy sectors. Consequently, besides coastal areas, these activities can also be found offshore.

According to Zhai Ren-Xiang and Li Wei (2013), the marine economy comprises various activities for the development of industries, the exploitation and protection of marine resources, and related activities. Like international studies, Vietnam also has diverse perspectives on the concept of the marine economy. According to Đào Duy Quát and Phạm Văn Linh (2008), the marine economy involves economic activities with three distinct economic benefits for humans: marine transport, the exploitation of marine resources, and tourism.

According to author Nguyen Ngoc Khanh (2024), marine economy is a field of activity that seeks human interests in the dialectical unity between productive forces and production relations and is expressed in the form of economic interest relations taking place at sea and related to the sea.

Based on respect for and alignment with the United Nations Convention on the Law of the Sea of 1982, Vietnam's Law of the Sea clearly states the principles for developing Vietnam's marine economy: (1) Serving the construction and socio-economic development of the country; (2) Linked to safeguarding national sovereignty, defense, security, and maritime safety; (3) Complying with resource management and marine environmental protection requirements; (4) Associated with the socio-economic development of coastal regions and islands. Vietnam's Law of the Sea also identifies six marine economic sectors prioritized for development: (1) Exploration, exploitation, processing of oil, gas, and other marine resources and minerals; (2) Marine transportation, ports, shipbuilding, and maritime services; (3) Marine tourism and island economy; (4) Exploitation, aquaculture, and seafood processing; (5) Development, research, application, and transfer of science and technology for marine economic development; (6) Building and developing marine human resources (National Assembly of Vietnam, 2012).

Thus, the marine economy can be understood as encompassing all economic activities directly conducted at sea (fishing, offshore oil and gas extraction, ports, marine transport, marine tourism, seafood processing, salt production) and economic activities directly related to marine activities (shipbuilding and repair, oil and gas processing, marine services, marine communication, scientific research and technology, marine resource and environment surveys, and human resource training for marine economic development).

2.1.2 The Concept of Digital Transformation in Marine Economic Development

Digital transformation is generally understood as the process of transitioning from traditional models to digital business models by applying new technologies. According to Gartner, a leading global research and IT consultancy, digital transformation is "the use of digital technologies to change business models, creating new opportunities, revenue streams, and values." It includes big data, the Internet of Things (IoT), cloud computing, and more, to transform governance, leadership, workflows, and organizational culture. Today, the applications of digital transformation are evident in all areas of life. Smart software and applications have completely changed traditional, complex processes, and this transformation is bringing substantial benefits to various fields. It boosts productivity, optimizes costs, and opens up new environments and opportunities for development.

The Organisation for Economic Co-operation and Development (OECD), in its 2016 publication “The Ocean Economy in 2030,” affirmed the importance of the marine economy for humanity's future prosperity. Globally, the marine economy has contributed significantly to job creation, income generation, economic growth, exports, and scientific and technological development. For Vietnam, leveraging the benefits of digital transformation by aligning it with inherent strengths can pave the way for breakthroughs in marine economic development. In the marine economy, digital transformation can shorten production processes and time, enhance worker productivity, enable access to advanced science and technology, improve production output and quality, and significantly promote tourism while reducing losses caused by natural disasters.

Ownership of production resources today is no longer limited to tangible assets but has expanded to intellectual property forms, such as scientific and technological works, patents, and information. Applying science and technology aids in discovering marine resources, creating new products, and innovating methods and tools. Hence, developing science and technology for the marine economy is essential, not only for economic benefits but also for national security and defense and marine and island protection.

Studies on marine economic development in conjunction with digital transformation have yet to be systematically carried out. Some studies have explored the potential of marine economic development but mostly focus on natural and socio-economic advantages of specific regions without addressing the application of digital transformation or science and technology. For instance, the study “Sustainable Development of Vietnam's Marine Economy Based on the Blue Economy Framework” by TS. Nguyễn Đình Đáp and Đoàn Thị Hồng Hạnh.

Applying digital technology in sustainable marine economic development involves transforming traditional marine economic operations into new technology-driven models, including big data, IoT, cloud computing, and artificial

intelligence. These innovations aim to revolutionize governance, production, business methods, and organizational culture, fostering growth while ensuring sustainable resource use, improving livelihoods, job opportunities, and the health of marine ecosystems.

For example, digital technology can promote marine economic growth and minimize environmental impacts from overexploitation through specific technical solutions such as the following. The Internet of Things (IoT) is applied in the installation of undersea sensors to monitor water quality, temperature, salinity and other environmental factors. These sensors collect real-time data, helping management agencies detect early abnormal changes in the marine environment, thereby taking timely corrective measures such as restricting exploitation in areas at risk of resource depletion. At the same time, geographic information systems (GIS) support spatial analysis and identify potential or overexploited areas, helping to optimize resource allocation and protect sensitive areas.

Artificial intelligence (AI) and big data can analyze past trends in marine resource use and predict future environmental impacts. For example, AI can optimize fishing schedules to avoid overfishing and help fishermen comply with seasonal or catch area restrictions. Furthermore, AI and big data can support the analysis of shipping operations, helping to reduce fuel waste and emissions, thereby reducing environmental impacts.

Digital technology also supports the circular economy through the management of marine waste, especially in industries such as oil and gas and marine tourism. Data monitoring and analysis systems can track the amount of waste released into the environment, thereby providing effective treatment or recycling measures. For example, blockchain technology can be used to track the treatment and recycling of marine waste, ensuring transparency and accountability in protecting the environment.

According to experts, one of the criteria to evaluate a strong marine nation or locality is its capacity for scientific and technological development related to the sea and its ability to ensure the sustainability of its marine ecosystems. With the application of digital technology, there will be a "data revolution" in sustainable marine economic management. In the coming decade, satellite imagery, remote sensing, big data, and artificial intelligence will generate unprecedented information about the sea, providing essential data for managing these valuable ecosystems. Modern scientific and technological advancements will become direct drivers of sustainable marine economic development (Digital Strategy, 2021). However, until now, there has not been a comprehensive study that explores the potential of digital transformation and its implementation in sustainable marine economic development in Vietnam, leveraging the country’s existing advantages and resources. This calls for further research to clarify this basis.

2.1.3 Research Methods

The article adopts the dialectical materialist methodology and employs qualitative research methods such as scientific abstraction, synthesis and analysis, logical-historical methods, and economic statistics to analyze secondary data on the marine economy.

By utilizing these research methods, the author has summarized and constructed the concept of the marine economy and analyzed the development of Vietnam’s marine economy over a historical period across various sectors and fields, specifically when digital transformation is applied. Based on events, historical data and practice, the logical method helps analyze the relationship between factors in the development of the marine economy, and can draw principles, strategies and forecasts on the impact of digital technology on the sustainable development of the marine economy in the future. Helps clarify how digital technologies can impact different areas of the marine economy, determine the relationship between the application of technology and economic, social and environmental efficiency in marine activities. Quantitative economic models are selected to analyze the relationships between digital technology and factors related to the development of the marine economy. Specifically, the linear regression model is used to estimate the impacts of digital technology on the development of industries in the marine economy. The findings from these methods contribute to constructing a comprehensive picture of Vietnam’s marine economy during the digital transformation process. These findings serve as an objective basis for identifying achievements that need to be further promoted, limitations that need to be overcome, and concrete and practical solutions for Vietnam's sustainable marine economic development in the new context.

2.2. The Current State of Digital Technology Application in Vietnam's Marine Economic Development

2.2.1. Exploitation, Aquaculture, and Seafood Processing

The aquaculture industry is undergoing a new revolution, centered on data and connectivity. Technologies such as robotics, sensors, artificial intelligence, and augmented/virtual reality can drive productivity in aquaculture and build sustainable development models. Leading seafood companies worldwide are adopting IoT and AI in aquaculture and production. They start by applying devices capable of transmitting data through connectivity protocols in aquatic environments.

The sustainable exploitation of marine resources through technology is a global trend. Technologies such as CMR can assist in selecting, sorting, and harvesting seafood based on advanced data analysis of hydroacoustic data. The Precision Seafood Harvesting technology, invented by Alistair Jerrett from New Zealand's Plant & Food Research Institute, revolutionizes fishing by enabling "precise seafood harvesting." This technology allows fish to swim comfortably underwater inside a flexible PVC mesh net, where species and sizes can be accurately sorted before being brought on deck. It targets specific species and sizes while allowing smaller or non-target species to escape through "escape ports." This innovation saves billions of marine animals trapped in nets annually, contributing to sustainable fishing while improving the flavor and quality of seafood.

Ultrasound technology, developed by Kongsberg Maritime, the Norwegian Marine Research Institute, and SIMRAD (Norway), is part of an integrated system with underwater cameras, fishing vessels, and acoustic transmitters. This system provides information about fish species and sizes to fishing vessels, allowing them to plan sustainable fishing strategies and optimize their catch. Accurate identification of fishing grounds helps reduce time, fuel consumption, and environmental impact (Vietnam Institute of Fisheries Science and Technology, 2021).

In 2023, the total aquaculture area in Vietnam was estimated at 1.3 million hectares of inland aquaculture and 9.5 million cubic meters of marine aquaculture cages. Marine aquaculture increased by 5.5%, including 4.3 million cubic meters of marine fish cages, 5.2 million cubic meters of lobster cages, and 57,000 hectares of mollusk aquaculture. The total marine aquaculture output reached 789,800 tons, an increase of 10.1% compared to 2022.

While aquaculture has developed steadily, marine capture production has decreased due to weather conditions and storms. Under the impact of climate change, applying advanced science and technology and using modern intelligent devices in aquaculture has been implemented in various localities. Provinces with strong marine economies, such as Phu Yen, Binh Dinh, and Bac Lieu, have been pioneers in applying digital technology to build seafood value chains. They aim to optimize processes and enhance the competitiveness of products domestically and internationally.

Additionally, businesses have gradually focused on creating linkages across the value chain, from raw material production to processing and consumption, to enhance efficiency. Some enterprises have established digital transformation roadmaps to optimize operations, reduce costs, and improve production capacity, aiming to become global players in aquaculture technology. Their strategic tasks include automating production processes, building big data for shrimp farming, developing aquaculture communities, and implementing transparent product traceability systems.

In addition, Vietnam also needs to learn from Norway in developing the aquaculture industry in a sustainable way. In Norway, according to regulations, all fish farms must be “rested” (not cultivated) for several months after each farming cycle, allowing the seabed time to recover. In particular, the seabed under fish farms must undergo strict inspections by independent organizations to protect the natural environment. Meanwhile, in Vietnam, overexploitation of fisheries and the lack of effective restrictions make it difficult for marine resources to recover.

2.2.2. Exploitation and Processing of Marine Minerals

Regarding seafood exploitation, the total output in 2023 is estimated at about 3.861 million tons, not reaching the set target. The reason is that in 2023, the seafood industry set a target to gradually reduce seafood exploitation output to about 3.68 million tons. In 2023, the total seafood capture production was estimated at 3.861 million tons, falling short of the target of 3.68 million tons. Of this, marine capture production accounted for 3.66 million tons, a 0.3% decrease compared to 2022. The number of fishing vessels decreased to 83,430, down by 6,292 compared to 2022’s total of 89,722 vessels. Specifically, vessels measuring 6-12 meters in length dropped to 37,770 (a reduction of 5,230 vessels); vessels measuring

12-15 meters totaled 16,000 (down 480 vessels); vessels 15-24 meters numbered 26,500 (down 470 vessels); and vessels over 24 meters were reduced to 2,510 (down 112 vessels).

The greatest limitation in aquaculture and seafood exploitation lies in the slow application of technological advancements and techniques in seafood harvesting and post-harvest preservation. This inadequacy has resulted in significant post-harvest losses, failing to meet the needs of the industry's development. Fishermen's traditional practices and habits have been slow to adapt to the modernization of fishing activities. Meanwhile, major seafood import markets worldwide, particularly the EU, the U.S., Japan, and South Korea, impose strict quality control and traceability requirements. In recent years, numerous seafood traceability methods and hundreds of independent systems have emerged in the seafood supply chain and among technology providers. These factors have created challenges for Vietnam's seafood exploitation sector, which must meet the increasingly stringent demands of importers.

Traditional fishing practices and the habits of fishermen have been slow to modernize, lagging behind the demands of a globalized and modernized fisheries sector. However, Vietnam still lacks a comprehensive strategy for marine energy minerals and has not yet built an accurate map of the potential for energy minerals in the entire sea. The strategy for oil and gas exploration is still unclear and depends heavily on foreign companies. Research on deep-sea and offshore island biology and ecology is slow, difficult, and has not even met the requirements for protecting marine resources, ecosystems, and the marine environment from degradation. In addition, the lack of equipment and financial resources means that Vietnam cannot conduct scientific research and basic surveys in distant seas, but is limited to coastal areas with a depth of less than 30 meters. For this reason, in-depth research projects such as exploring the laws of the East Sea, studying marine interactions, forecasting natural disasters, ensuring port safety, and discovering new mineral deposits to serve national defense and security and develop the marine economy are still very limited. International markets, including the EU, USA, Japan, and South Korea, impose stringent requirements for quality control and traceability. This poses significant challenges for Vietnam's seafood capture industry.

2.2.3. Marine Transportation

Vietnam boasts over 3,200 kilometers of coastline and an extensive network of rivers and canals, with over 17,000 kilometers of inland waterways currently in use. This provides significant potential for further development. Vietnam is particularly competitive in transporting large volumes of goods over long distances, with routes connecting Asia (e.g., China, Singapore, Malaysia) to Europe (e.g., the Netherlands, Belgium) and North America.

Domestic inland waterway transport has made remarkable progress, with new coastal routes reducing the burden on North-South road corridors. However, investment in inland waterway infrastructure has yet to match its role in the national transport system. Investments in ports and waterways remain insufficient, and planning across sectors lacks cohesion.

2.2.4 Tourism and Marine Services

The tourism and marine services industry has significantly enhanced its application of digital technology to create smart tourism ecosystems with high economic and social value. A notable trend is the shift from e-tourism (online tourism) to smart tourism (smart tourism ecosystems). Smart tourism relies on databases to bring innovation to managing tourist destinations and enhancing visitor experiences. This contributes to improving the quality and sustainability of tourism models. The sustainable smart tourism model includes six main aspects, offering higher value to tourists while creating economic development opportunities for the tourism industry and local communities.

According to Vietnam Tourism Database from the General Department of Tourism in 2021, 28 coastal provinces and cities had 1,291 domestic and international travel companies registered with licenses, accounting for 53.6% of all licensed travel companies in the country. Meanwhile, there were 7,703 lodging establishments along coastal areas, representing 66.7% of the total lodging establishments nationwide. These establishments include diverse types such as hotels, tourist apartments, cruise ships, guest houses, private homes for rent, camping sites, and tourist villas, ranging from standard service to five-star accommodations. In addition, coastal provinces offer a wide variety of tourism products with unique characteristics. For example, coastal areas in the North focus on sightseeing and ecological tourism, while the southern coastal areas emphasize ecological tourism, sightseeing combined with recreational tourism, and water sports. As a result, marine tourism has attracted a large number of domestic and international tourists from major markets such as ASEAN, China, Japan, South Korea, Australia, the US, Canada, and Europe, generating significant revenue for local communities.

Coastal provinces in Vietnam have actively implemented digital transformation to improve the efficiency of tourism activities. The trend of international visitors returning post-pandemic has shown a gradual recovery. Notably, in the second half of 2023, international visitors exceeded one million per month, with December witnessing the highest number at 1.37 million.

Chart 1: International visitors in 2019, 2022 and 2023 (per visit)



Source: Vietnam General Statistics Office

Smart tourism applications available on Android and iOS platforms have been introduced, making it easier for visitors to find information and services. In 2022, 3D technology was applied to recreate aerial views of tourist destinations, offering vivid and immersive experiences for travelers. The 1022 information portal was launched to provide tourism-related information and allow visitors to directly report service quality issues to local authorities. Additionally, prominent tourist sites have been uploaded to Google Earth and Google Maps, enabling travelers to easily plan their itineraries. Tourism products are also available on e-commerce platforms such as Agoda, Traveloka, and Trivago, providing new channels for customers to access services.

In Đa Nang, the VR360 virtual reality application, "One Touch to Đà Nẵng," enables visitors to explore the city through 360-degree visuals with automatic bilingual narration in English and Vietnamese. This technology not only enhances the visitor experience but also supports better tourism management. Similarly, Quảng Ninh has leveraged social media platforms such as Facebook, Zalo, YouTube, Instagram, and TikTok to promote destinations like Hạ Long Bay and Bai Tu Long, making it easier for travelers to explore and book services online (Communist Party of Vietnam Online Newspaper, 2022).

Currently, cruise ships in Vietnam mainly use diesel fuel or heavy fuel oil to operate. These ships often run on internal combustion engines, with the characteristic of large capacity to be able to move quickly and operate stably throughout the long journey. Meanwhile, the service and technical systems at seaports are not synchronized, leading to passenger ships not being able to dock because they have to give up their positions to cargo ships, affecting the reputation of the destination. Therefore, Vietnam needs to quickly learn and apply digital technology and green technology to develop, becoming one of the strongest development types, contributing to promoting the development of Vietnamese tourism and enhancing the brand in the international market.

2.3. Recommendations for Strengthening the Use of Digital Technology in Marine Economic Development in Vietnam

First, raising awareness about the application of digital technology in sustainable marine economic development.

The solution to raise awareness of the application of digital technology in sustainable development of the marine economy is a priority solution because it has a profound influence and positive impact on many important areas in the marine economy. Because it helps optimize production efficiency, reduce costs and improve productivity in marine economic sectors, from aquaculture to marine tourism. In addition, digital technology plays an important role in monitoring and protecting marine resources, minimizing negative impacts on the environment and ensuring sustainable development. Improving connectivity and information through technology also helps improve the safety of fishermen and offshore workers, while creating opportunities for coastal and island communities to access advanced technologies, thereby developing the economy in an equitable and inclusive manner. Therefore, the application of digital technology not only supports the development of the marine economy but also protects resources and ensures long-term, sustainable development for this industry. This effort applies to all marine economic activities and stakeholders, especially key groups such as marine economic governance entities, marine economic enterprises, marine technology personnel, and educational institutions for marine technology. Science and technology are seen as pivotal breakthroughs to meet the demands of sustainable marine economic development and innovation. It is essential to leverage advanced scientific and technological achievements, attract leading experts and scientists, and build a high-quality workforce. This effort must begin with a strategic vision for sustainable marine economic development toward building a green marine economy. Based on this vision and orientation, appropriate scientific and technological missions and solutions will be selected. Leadership's determination and technological vision will serve as the starting point, spreading to organizations, society, and programs or projects that apply technology in practice.

Awareness-raising efforts should focus on helping individuals and organizations understand the transformative impact of digital technology applications in marine economic development. This includes grasping global trends and experiences in sustainable marine economic development and understanding the specific digital technologies applied in marine economic sectors. Furthermore, it is vital to emphasize building a digital culture among citizens and the marine economic workforce (Digital Strategy, 2021).

Second, improving internet connectivity with high speed and affordable costs to enhance links between consumers and information networks.

This is particularly crucial for offshore islands, where network coverage remains weak and limited. Although internet connectivity for tourists, fishermen, and offshore workers is feasible, current network quality and bandwidth do not meet national standards. Upgrading network infrastructure to expand coverage and improve stability will bring numerous benefits to the marine economy. Enhanced connectivity will attract more tourists as their internet needs are met at tourist destinations. For fishermen and offshore workers, better connectivity will improve safety, allowing them to receive timely updates on storms and rough seas, enabling proactive responses. They can also communicate with other vessels in the area for assistance in emergencies. For remote archipelagos such as Hoàng Sa and Trường Sa, a stable internet connection will enhance residents' quality of life by facilitating communication with the mainland. Funding for these network infrastructure upgrade projects can be mobilized from the state budget, preferential loans from international organizations, along with contributions from telecommunications enterprises and private investors. The projects can apply the public-private partnership model to share investment costs and benefits, while taking advantage of the participation of telecommunications companies in providing network infrastructure and services. The expected completion time for these projects can last from 3 to 5 years, depending on the difficulty level of each area and the ability to mobilize capital. In the first phase, improving connectivity in key sea and island areas and areas with high tourist numbers will be prioritized, before expanding to the remaining areas.

Third, prioritizing the establishment of a specialized data center for exploration and exploitation activities.

This center should integrate all geological, geographical, and physical data while developing analytical tools that leverage artificial intelligence (AI) and machine learning (ML). These technologies will optimize the identification of drilling locations, minimize associated risks, and enhance overall operational efficiency. During mine development, this data center will play a critical role in connecting and integrating data from contractors, projects, and operators, forming the foundation for analytical and strategic optimization in drilling campaigns. For new extraction sites, it is necessary to install sensor systems to collect comprehensive data for advanced analysis. For existing sites, categorizing assets based

on profitability potential is crucial. High-potential sites can be modernized with additional sensors to gather and process data effectively (Nguyen Hong Minh, 2020). These solutions aim to increase output and improve oil recovery rates. Furthermore, other needs related to equipment, spare parts, tools, and support services for extraction activities remain. Integrating data, sharing lessons learned from common challenges, and using advanced algorithms to identify optimal extraction patterns will yield significant benefits for all stakeholders.

Fourth, increasing investment and attracting strategic investors to modernize, sustain, and enhance economic development in coastal regions.

To meet the goals outlined in Resolution No. 36 of the People's Committee, efforts should focus on redefining investment strategies and attracting capital from domestic and international sources. This includes implementing targeted investment promotion activities, prioritizing large-scale, high-value projects that employ modern technology and create global supply chain connections. Such projects must also be environmentally friendly. Specifically, these investment should be attrative to nations with strong financial, technological, and managerial capabilities, such as the US, the EU, Japan, South Korea, Singapore, and Russia. Localities must prepare infrastructure, land, and human resources to create favorable conditions for foreign direct investment (FDI) and capitalize on global mobility trend. On another hand, progressively eliminate aqua project that are harmful for the environment (takes up to much land, energy wasted or outdated technological implementation). However, some strategic investors may focus on short-term profits without paying attention to the sustainable development of local communities. This may lead to ignoring the needs of coastal people, such as creating sustainable jobs, protecting traditional cultures or ensuring their participation in the development process. In addition, investment projects may create social divisions, when the benefits from investment are not distributed fairly among community groups. Local people may not receive many benefits from these projects, leading to inequality and social instability. In summary, although attracting strategic investment solutions can help develop the economy of coastal areas, effective control and management mechanisms are needed to avoid negative impacts, ensuring sustainable and equitable development for local communities.

Fifth, promoting the application of science and technology to meet the demands of the Fourth Industrial Revolution.

Governments should allocate budgets to improve the capacity of scientific institutions, laboratories, and high-tech research zones. By 2025, the goal is to master and effectively apply advanced technologies in key industries of coastal regions. Public-private partnerships should establish venture funds for research and technology development while continuing to build technology trading platforms to commercialize research outcomes. Efforts should focus on fostering collaboration between managers, scientists, investors, and manufacturers to strengthen research and application of digital technologies such as 5G, AI, block chain, and clean energy technologies.

Sixth, developing high-quality human resources to meet the demands of modern coastal economic development.

To ensure adequate human resources for implementing Resolution No. 36 of the People's Committee, mechanisms and policies must be created to encourage investments in high-standard private schools and promote collaboration between businesses and educational institutions. Policies should attract talents, experts, and skilled workers to coastal areas. Training programs must align with real labor market needs and the demands of technology development. Special attention should be paid to life skills, professional skills, foreign language proficiency, and integration skills, ensuring learners meet employers' requirements.

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EVALUATING THE IMPACT OF ESG ON CUSTOMER EXPERIENCE AND LOYALTY: A CASE STUDY OF MANUFACTURING ENTERPRISES IN DONG NAI PROVINCE

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ABSTRACT

This study investigates the impact of Environmental (EM), Social (SL), and Governance (GN) factors on Customer Experience (CE) and Customer Loyalty (CL) in manufacturing enterprises in Dong Nai Province. Using a mixed-methods approach, the research analyzes data from 323 respondents through Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings confirm that ESG practices significantly enhance CE and CL, with governance and environmental factors showing the strongest influence. Additionally, CE is identified as a critical mediating variable, amplifying the indirect effects of ESG factors on CL. The study provides actionable recommendations for businesses to prioritize governance, sustainability initiatives, and customer-centric strategies. Despite its contributions, the research highlights limitations, including geographic scope and cross-sectional design, and suggests future studies focus on expanding scope, incorporating longitudinal methods, and exploring industry-specific contexts. These insights offer a comprehensive roadmap for integrating ESG practices to build sustainable customer relationships.

Keywords: "Customer experience", "Customer loyalty", "Dong Nai Province", "ESGs", "Manufacturing enterprises".

1. INTRODUCTION

In recent years, the importance of Environmental, Social, and Governance (ESG) factors has risen significantly in both academic and business circles. ESG initiatives have been recognized as critical components that contribute to sustainable business operations and enhance stakeholder value (Antavo, 2024). As customer expectations continue to evolve, businesses are increasingly motivated to incorporate ESG practices to strengthen customer relationships and foster loyalty. This study investigates the influence of ESG factors on customer experience (CE) and customer loyalty (CL), with a particular focus on manufacturing enterprises in Dong Nai Province.

Customer experience and loyalty are widely regarded as pivotal in determining a company's competitive edge in the market (Qualtrics XM Institute, 2024). These constructs not only ensure customer retention but also drive long-term profitability. However, the specific mechanisms through which ESG practices impact CE and CL remain underexplored in the context of manufacturing enterprises. By addressing this gap, this study aims to provide actionable insights for businesses seeking to align their sustainability initiatives with customer expectations.

This research builds upon theoretical frameworks that connect ESG practices with customer outcomes. Through the use of statistical models, the study examines the pathways through which environmental, social, and governance dimensions influence customer perceptions and behaviors. The findings are expected to offer valuable contributions to the literature and practical recommendations for enterprises in Dong Nai Province.

2. RESEARCH OVERVIEW

2.1. Overview of related research

The integration of Environmental, Social, and Governance (ESG) factors into business practices has garnered significant attention in academia and industry. Studies show that companies adopting ESG initiatives not only support sustainable development but also enhance brand image, customer satisfaction, and loyalty (Antavo, 2024). This is particularly relevant in manufacturing, where environmental and social impacts are substantial. Research highlights that environmentally friendly practices, like renewable energy adoption and waste management, significantly improve

customer perceptions of a company's sustainability commitment (Loyalty360, 2024). Similarly, corporate social responsibility (CSR) efforts, such as fair labor conditions and community engagement, strengthen trust and customer engagement (KEY ESG, 2024). Governance practices, including transparency, regulatory compliance, and ethical leadership, are also critical for fostering loyalty, as customers value companies that resolve complaints ethically and responsibly (EY, 2024).

Despite a growing body of research, few studies have examined the impact of ESG practices on manufacturing enterprises in developing regions like Dong Nai Province. This industrializing area presents a unique opportunity to explore how ESG initiatives resonate with customers amidst pronounced environmental and social challenges. The study addresses gaps in understanding the interconnected role of ESG dimensions—environmental, social, and governance—in shaping customer outcomes. While environmental practices, such as renewable energy use, are well-documented, the combined effects of social and governance factors on customer perceptions remain underexplored (KEY ESG, 2024). Additionally, research often overlooks the mediating role of customer experience (CE) in the relationship between ESG practices and customer loyalty (CL). Although ESG's positive influence on loyalty is recognized, the mechanisms—particularly through enhanced customer experiences—require further investigation (Qualtrics XM Institute, 2024). By addressing these gaps, this study contributes valuable insights into the holistic impact of ESG practices on CE and CL, particularly within the manufacturing sector in rapidly developing regions.

2.2. Theoretical basis

Environmental, Social, and Governance (ESG) factors assess a company's sustainability and ethics. Environmental aspects include carbon footprint and renewable energy; social focuses on fair labor and community engagement; governance emphasizes ethical leadership and transparency. ESG drives customer trust, investment appeal, and competitiveness, fostering strong stakeholder relationships.

Customer Experience (CE) refers to the cumulative perception that customers have of their interactions with a company throughout the customer journey, from initial engagement to post-purchase services. It includes factors such as service quality, ease of communication, transparency, and the perceived value of products or services. A positive customer experience creates emotional connections, builds trust, and enhances satisfaction, which are critical for fostering long-term customer relationships (Qualtrics XM Institute, 2024).

Customer Loyalty (CL) is the extent to which customers repeatedly engage with a company, showing a preference for its products or services over competitors. Loyalty manifests in repeat purchases, recommendations to others, and a willingness to overlook minor issues or higher prices. Loyalty is deeply influenced by customer experience; a superior experience often translates into higher customer retention and advocacy (Antavo, 2024).

The role of ESG in enhancing Customer Experience and Loyalty: Environmental, Social, and Governance (ESG) factors play a crucial role in shaping customer experience (CE) and fostering loyalty (CL). As ethical and sustainable practices gain importance among customers, businesses that adopt ESG initiatives not only improve efficiency but also align with customer values. Research highlights that ESG practices significantly influence customer perceptions and behaviors (Antavo, 2024). Environmental efforts, such as renewable energy use and waste management, build trust by showcasing sustainability commitment. Social initiatives, like fair labor practices and community engagement, enhance brand ethics and emotional connections. Governance practices, including transparency and ethical leadership, foster credibility and long-term trust (Freeman, 1984). By improving CE through ESG, businesses create strong emotional bonds, essential for loyalty. Enhanced CE promotes repeat purchases and brand advocacy, driving growth and sustainability (Qualtrics XM Institute, 2024). Integrating ESG into strategy is vital for lasting customer relationships and competitive advantage.

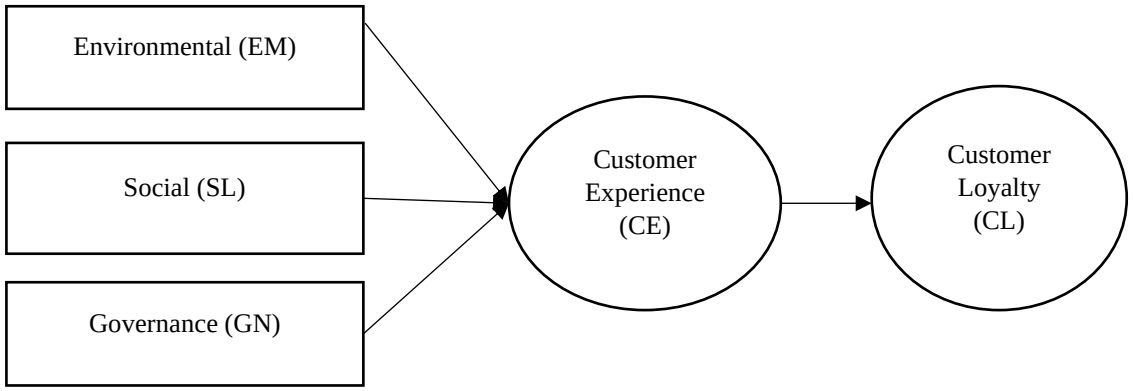
The study of Environmental, Social, and Governance (ESG) factors and their influence on customer experience (CE) and loyalty (CL) is grounded in several theories. Stakeholder theory highlights the importance of addressing stakeholder needs, including customers, to build trust and achieve success (Freeman, 1984). The resource-based view (RBV) emphasizes intangible assets, like a reputation for sustainability, as key competitive advantages (Barney, 1991). The CE framework underscores the role of consistent, high-quality interactions, while ESG practices, such as transparency and community engagement, boost customer loyalty (Qualtrics XM Institute, 2024). Lastly, the theory of planned behavior

(TPB) explains how ESG shapes customer attitudes, driving loyalty and advocacy (Ajzen, 1991). Together, these theories frame the study of ESG's role in CE and CL within manufacturing.

3. RESEARCH METHODS

3.1. Research model

Figure 1. Research Model



Source: Recommended author

3.2. Developing research hypothesis

The development of research hypotheses is guided by theoretical frameworks and existing literature on the influence of Environmental, Social, and Governance (ESG) factors on customer experience (CE) and customer loyalty (CL). This study investigates these relationships within the context of manufacturing enterprises, providing a deeper understanding of how ESG practices shape customer perceptions and behaviors.

Environmental sustainability is a key dimension of ESG and a critical determinant of customer perception. Companies that prioritize environmental practices, such as utilizing renewable energy, reducing carbon footprints, and implementing effective waste management systems, are often viewed as responsible and forward-thinking by customers (Antavo, 2024). Customers value organizations that actively contribute to environmental preservation, leading to positive experiences.

Hypothesis 1 (H_1): Environmental practices (EM) have a positive impact on customer experience (CE).

Furthermore, customer loyalty is indirectly influenced by environmental initiatives. When customers perceive that a company is committed to sustainability, their trust and commitment increase. Positive experiences mediated by these practices often translate into loyalty.

Hypothesis 5 (H_5): Environmental practices (EM) positively influence customer loyalty (CL) through customer experience (CE).

Social responsibility within ESG emphasizes fair treatment of employees, community engagement, and addressing social issues. Organizations that engage in charitable activities, promote diversity, and ensure fair labor practices tend to create a positive impression among customers. Social practices also contribute to building trust, which is essential for a superior customer experience (Loyalty360, 2024).

Hypothesis 2 (H_2): Social practices (SL) have a positive impact on customer experience (CE).

Similarly, when social practices enhance customer experience, they also encourage loyalty. Customers are more likely to remain committed to companies they perceive as socially responsible and aligned with their values. *Hypothesis 6 (H_6): Social practices (SL) positively influence customer loyalty (CL) through customer experience (CE).*

Governance represents the ethical and operational backbone of ESG. Practices such as transparency, regulatory compliance, ethical leadership, and efficient handling of customer complaints strengthen customer trust. Companies that uphold high governance standards ensure that customers feel secure and valued, which directly impacts their experience (KEY ESG, 2024).

Hypothesis 3 (H_3): Governance practices (GN) have a positive impact on customer experience (CE).

Governance practices also indirectly impact loyalty through customer experience. When companies demonstrate

ethical leadership and transparency, customers are more inclined to trust their operations and remain loyal, even in competitive markets.

Hypothesis 7 (H_7): Governance practices (GN) positively influence customer loyalty (CL) through customer experience (CE).

Customer experience is a key mediating factor between ESG practices and loyalty. The customer experience framework highlights that superior interactions and perceptions of value significantly enhance customer retention. Positive experiences, such as excellent service quality, transparency in communication, and added value, strengthen the emotional connection between customers and companies (Qualtrics XM Institute, 2024). *Hypothesis 4 (H_4): Customer experience (CE) has a positive impact on customer loyalty (CL).*

*Integrated Relationships: "*The study's hypotheses collectively aim to examine the direct and indirect effects of ESG practices on customer loyalty, with customer experience serving as a critical mediating variable. These hypotheses are grounded in stakeholder theory, resource-based views, and the theory of planned behavior, providing a robust foundation for empirical testing. By exploring these relationships, the study seeks to provide actionable insights for manufacturing enterprises in Dong Nai Province, particularly in aligning ESG practices with customer expectations".

3.3. Scale table

Table 1: Factors of the scale

STT	Ampersand	Observation variables	Citation
1		**Scale of Environmental (EM)**	
1.1	EM1	The company utilizes renewable energy sources in its operations	Antavo. (2024)
1.2	EM2	The company implements effective waste management and recycling programs	
1.3	EM3	The company actively works to reduce its carbon footprint.	
1.4	EM4	The company's products/services are environmentally friendly	
1.5	EM5	The company engages in initiatives that promote environmental sustainability	
2		**Scale of Social (SL)**	
2.1	SL1	The company ensures safe and fair working conditions for its employees	Loyalty360. (2024)
2.2	SL2	The company contributes positively to the local community	
2.3	SL3	The company values customer feedback and addresses concerns promptly	
2.4	SL4	The company engages in charitable activities and social initiatives	
2.5	SL5	The company respects human rights and promotes cultural diversity	
3		**Scale of Governance (GN)**	
3.1	GN1	The company is transparent in its business operations and disclosures	KEY ESG. (2024)
3.2	GN2	The company complies with legal standards and regulations	
3.3	GN3	The company's leadership demonstrates a commitment to sustainable development	
3.4	GN4	The company upholds high ethical standards in its business dealings	
3.5	GN5	The company has effective mechanisms for addressing customer complaints	
4		**Scale of Customer Experience (CE)**	

STT	Ampersand	Observation variables	Citation
4.1	CE1	The company's customer service meets my expectations	Qualtrics XM Institute. (2024)
4.2	CE2	The company provides clear and transparent information about its offerings	
4.3	CE3	The company offers value that exceeds that of its competitors	
5		**Scale of Customer Loyalty (CL)**	
5.1	CL1	Intend to continue purchasing from this company in the future	EY. (2024)
5.2	CL2	Recommend this company's products/services to others	
5.3	CL3	Consider this company to be the first choice in its industry	
5.4	CL4	Trust that this company acts in the best interest of its customers	
5.5	CL5	Willing to remain loyal to this company even if prices increase slightly	

Source: Self-synthesized author

3.4. Research methods

This study uses a mixed-methods approach to explore the influence of ESG practices on customer experience (CE) and loyalty (CL) in manufacturing enterprises in Dong Nai Province. Data were collected via a structured questionnaire with a 5-point Likert scale, targeting 323 respondents selected through stratified random sampling. Key variables included environmental, social, and governance factors. Partial Least Squares Structural Equation Modeling (PLS-SEM) analyzed the data, assessing relationships between variables. Ethical considerations, such as informed consent and confidentiality, were prioritized, with the study focusing on manufacturing enterprises in Dong Nai Province.

4. RESULTS AND DISCUSSION

4.1. Statistical Description

Table 2. Data Statistics

Variables Mouth	Classify	Suitable research sample		Sum
		Number of Survey Samples	Proportion %	
Gender	Male	216	66.87%	323/100%
	Female	107	33.13%	
Age	From 18 to under 25 years old	89	27.55%	323/100%
	Between 25 and 50 years old	168	52.01%	
	Over 50 years old	66	20.43%	
Degree Education	High School	96	29.72%	323/100%
	College/University	105	32.51%	
	Postgraduate	73	22.60%	
	Different	49	15.17%	
Income	Less than 15 million VND/month	89	27.55%	323/100%
	From 15-30 million VND/month	155	47.99%	
	Over 30 million VND/month	79	24.46%	

Source: Extracted from SmartPLS

Table 2 provides a detailed overview of respondents' demographics, showcasing diversity in gender, age, education, and income. Male participants formed 66.87% of the sample, while females accounted for 33.13%. Age-wise, 52.01% were aged 25–50, 27.55% were 18–24, and 20.43% were over 50. Regarding education, 32.51% held college or university degrees, 29.72% completed high school, and 22.60% had postgraduate qualifications. Income distribution showed 47.99% earning 15–30 million VND/month, 27.55% earning below 15 million, and 24.46% earning above 30 million. This diverse sample enables an in-depth exploration of ESG's impact on customer experience and loyalty.

4.2. Measurement model

Table 3. Scale statistics (n=209)

Scale	Mean	SD	Outer Loadings	α	rho_A	AVE	CR
Environmental (EM)				**0,830**	**0,833**	**0,880**	**0,595**
EM1	3,691	0,938	0,788				
EM2	3,734	0,936	0,781				
EM3	3,706	0,949	0,765				
EM4	3,886	0,845	0,716				
EM5	3,790	0,847	0,724				
Social (SL)				**0,810**	**0,814**	**0,868**	**0,567**
SL1	3,953	0,876	0,744				
SL2	3,877	0,942	0,789				
SL3	3,651	1,036	0,800				
SL4	3,894	0,930	0,761				
SL5	3,813	0,939	0,772				
Governance (GN)				**0,833**	**0,835**	**0,881**	**0,598**
GN1	3,897	0,834	0,755				
GN2	3,788	0,917	0,801				
GN3	3,770	0,866	0,765				
GN4	3,920	0,860	0,718				
GN5	3,811	0,911	0,724				
Customer Experience (CE)				**0,790**	**0,795**	**0,877**	**0,704**
CE1	3,675	0,958	0,800				
CE2	3,632	1,083	0,865				
CE3	3,546	1,089	0,851				
Customer Loyalty (CL)				**0,853**	**0,862**	**0,894**	**0,629**
CL1	3,804	0,877	0,799				
CL2	3,860	0,828	0,782				
CL3	3,851	0,871	0,840				
CL4	3,863	0,869	0,794				
CL5	3,963	0,867	0,748				

Source: Extracted from SmartPLS

Table 3 evaluates the reliability and validity of measurement scales for Environmental (EM), Social (SL), Governance (GN), Customer Experience (CE), and Customer Loyalty (CL). Cronbach's Alpha (α) values, ranging from 0.790 (CE) to 0.853 (CL), indicate high internal consistency, surpassing the 0.7 threshold (Hair et al., 2014). Composite reliability (CR) values above 0.85 further confirm reliability. Convergent validity is established with average variance extracted (AVE) values exceeding 0.50, such as CE's AVE of 0.704 (Fornell & Larcker, 1981). Outer loadings above 0.7 demonstrate strong alignment of variables with latent constructs. These results affirm the robustness of the measurement model, supporting the analysis of ESG factors' impact on CE and CL.

Table 4. Discriminant Validity

	EM	SL	GN	CE	CL
EM	**0,771[a]**				
SL	0,624	**0,773[a]**			
GN	0,704	0,728	**0,753[a]**		
CE	0,584	0,531	0,599	**0,839[a]**	
CL	0,750	0,738	0,804	0,709	**0,793[a]**

Source: Extracted from SmartPLS

Table 4 assesses the discriminant validity of constructs using the Fornell-Larcker criterion, a widely accepted method for ensuring each construct measures a distinct concept (Fornell & Larcker, 1981). The square root of the Average Variance Extracted (AVE) for each construct is shown on the diagonal of the correlation matrix and is higher than its correlations with other constructs. For instance, the square root of AVE for Customer Loyalty (CL) is 0.793, exceeding its correlations with Governance (GN, 0.804), Social (SL, 0.738), and Environmental (EM, 0.750), confirming discriminant validity. Additionally, inter-construct correlations, such as GN and CL (0.804) or SL and CL (0.738), are significant but do not compromise the uniqueness of constructs. These findings validate that constructs are not interchangeable and are measured independently, ensuring the measurement model's robustness. This strong discriminant validity enhances confidence in the structural model and its hypothesized relationships.

Table 5. Model Fit

	Saturated	Estimate
SRMR	0,070	0,134
d_ULS	1,339	4,976
d_G	0,498	0,717
Chi-Square	2221,296	2269,317
NFI	0,790	0,738

Source: Extracted from SmartPLS

Table 5 evaluates the fit of the research model using key indices, including the standardized root mean square residual (SRMR), distance measures (d_ULS and d_G), chi-square, and the normed fit index (NFI). The SRMR for the saturated model is 0.070, below the threshold of 0.08, indicating a good fit (Henseler et al., 2014). The distance measures, d_ULS (1.339) and d_G (0.498), confirm the alignment of the model with the observed data. Chi-square values, 2221.296 (saturated) and 2269.317 (estimated), are reasonable given the sample size of 323 respondents, despite the known sensitivity of chi-square to sample size. The NFI values of 0.790 (saturated) and 0.738 (estimated) suggest an acceptable fit, though slightly below the ideal threshold of 0.9 (Bentler, 1990). Overall, these metrics confirm that the model is robust and capable of accurately testing the hypothesized relationships between constructs.

Table 6. Discriminative Analysis (HTMT)

	EM	SL	GN	CE	CL
EM					
GN	**0,741**				
SL	0,856	**0,834**			
CE	0,716	0,645	**0,741**		
CL	0,841	0,822	0,843	**0,848**	

Source: Extracted from SmartPLS

Table 6 evaluates the discriminant validity of constructs using the Heterotrait-Monotrait Ratio (HTMT), a more robust method for assessing construct distinctiveness in structural equation modeling (Henseler et al., 2015). HTMT values for all constructs are below the 0.90 threshold, confirming discriminant validity. For example, the HTMT value between Environmental (EM) and Customer Loyalty (CL) is 0.841, between Social (SL) and Governance (GN) is 0.834, and between Governance (GN) and Customer Experience (CE) is 0.741. These results confirm the constructs' uniqueness, ensuring the structural model reflects genuine associations rather than biases. This validation solidifies the foundation for examining ESG factors' impact on customer experience and loyalty.

4.3. Structural model

Table 7. Path Coefficients

Hypothesis	Relationship	Original Sample (O)	Sample Msean (M)	STDEV	t Statistics	P Values
H_1	EM→CE	0,293	0,298	0,048	6,095	0,000

H_2	SL→CE	0,131	0,134	0,051	2,576	0,010
H_3	GN→CE	0,297	0,293	0,051	5,869	0,000
H_7	CE→CL	0,709	0,710	0,019	37,780	0,000

Source: Extracted from SmartPLS

Table 7 analyzes the relationships between constructs in the research model using path coefficients, highlighting their strength and significance. Environmental factors (EM) significantly influence customer experience (CE) with a coefficient of 0.293, t-statistics of 6.095, and p-value < 0.001. Social factors (SL) also positively impact CE, though with a smaller effect size (coefficient = 0.131, t = 2.576, p = 0.010). Governance factors (GN) show a strong positive effect on CE, with a coefficient of 0.297, t = 5.869, and p-value < 0.001. Additionally, CE significantly impacts customer loyalty (CL), with a high coefficient of 0.709, t = 37.780, and p-value < 0.001. These results validate stakeholder theory, emphasizing that effective ESG practices enhance customer experience, ultimately fostering loyalty (Freeman, 1984).

4.4. Analysis of the role of intermediate variables

Table 8. Specific Indirect Effects

Relationship	Original Sample (O)	Sample Mean (M)	STDEV	t Statistics	P Values
EM→CE→CL	0,208	0,212	0,036	5,750	0,000
SL→CE→CL	0,093	0,095	0,036	2,591	0,010
GN→CE→CL	0,211	0,209	0,037	5,686	0,000

Source: Extracted from SmartPLS

Table 8 highlights the mediating role of customer experience (CE) in the relationship between Environmental (EM), Social (SL), and Governance (GN) factors and customer loyalty (CL). The indirect effect of EM on CL through CE is 0.208, with t-statistics of 5.750 and a p-value < 0.001, confirming that CE mediates the positive impact of environmental practices on loyalty. Similarly, SL positively influences CL via CE, with an indirect effect of 0.093, t-statistics of 2.591, and p-value 0.010, although the effect size is smaller. Governance (GN) demonstrates a stronger indirect effect on CL through CE, with a coefficient of 0.211, t-statistics of 5.686, and a p-value < 0.001. These findings underscore the critical role of CE as a mediator, particularly for governance and environmental factors. This aligns with the theory of planned behavior, emphasizing the importance of perceptions in driving loyalty (Ajzen, 1991).

Table 9. Total Effects

Hypothesis	Relationship	Original Sample (O)	Sample Msean (M)	STDEV	t Statistics	P Values
H_1	EM→CE	0,293	0,298	0,048	6,095	0,000
H_2	CE→CL	0,208	0,212	0,036	5,750	0,000
H_3	SL→CE	0,131	0,134	0,051	2,576	0,010
H_4	SL→CL	0,093	0,095	0,036	2,591	0,010
H_5	GN→CE	0,297	0,293	0,051	5,869	0,000
H_6	GN→CL	0,211	0,209	0,037	5,686	0,000
H_7	CE→CL	0,709	0,710	0,019	37,780	0,000

Source: Extracted from SmartPLS

Table 9 evaluates the total effects of Environmental (EM), Social (SL), and Governance (GN) factors on Customer Experience (CE) and Customer Loyalty (CL), highlighting their overall influence within the research model. EM shows a significant total effect on CE (0.293, t = 6.095, p < 0.001) and CL (0.208, t = 5.750, p < 0.001), emphasizing the importance of environmental practices in shaping customer outcomes. SL has a smaller but statistically significant total effect on CE (0.131, t = 2.576, p = 0.010) and CL (0.093, t = 2.591, p = 0.010). GN exhibits the strongest impact on CE (0.297, t = 5.869, p < 0.001) and CL (0.211, t = 5.686, p < 0.001), underscoring the critical role of governance. CE exerts the most substantial influence on CL (0.709, t = 37.780, p < 0.001). These findings align with stakeholder theory, which emphasizes that addressing stakeholder expectations through robust ESG practices enhances customer outcomes

(Freeman, 1984).

5. CONCLUSIONS AND RECOMMENDATIONS

This study examines the impact of Environmental (EM), Social (SL), and Governance (GN) factors on Customer Experience (CE) and Customer Loyalty (CL) in manufacturing enterprises in Dong Nai Province, validating all proposed hypotheses and revealing nuanced differences in their influence. Hypothesis 1 (H1) shows that EM has a strong positive effect on CE (path coefficient = 0.293, t = 6.095, p < 0.001), highlighting the significant role of practices like renewable energy use and waste management. This aligns with the resource-based view, which posits that sustainability initiatives build intangible assets for competitive advantage (Barney, 1991). Compared to EM, Social factors (SL), as per Hypothesis 2 (H2), exhibit a smaller but meaningful effect on CE (path coefficient = 0.131, t = 2.576, p = 0.010). While social initiatives like fair labor practices enhance satisfaction, their impact is less pronounced, reflecting the relatively greater visibility and immediacy of EM and GN. Hypothesis 3 (H3) confirms GN as the strongest influencer of CE (path coefficient = 0.297, t = 5.869, p < 0.001), underscoring the importance of transparency and ethical governance, consistent with stakeholder theory (Freeman, 1984). Hypothesis 4 (H4) identifies CE as the most influential driver of CL (path coefficient = 0.709, t = 37.780, p < 0.001), while CE also mediates the effects of ESG factors on CL (H5-H7). These comparisons underscore governance and environmental factors' critical roles, with CE serving as a powerful mediator in fostering customer loyalty. From the above results, the author proposes the following recommendations:

First, Governance as a Priority: Manufacturing enterprises should strengthen governance by improving transparency, ethical leadership, and effective customer feedback mechanisms. These practices significantly influence CE and CL, making them a strategic priority.

Sencond, Environmental Sustainability Initiatives: Expanding efforts in renewable energy use, waste reduction, and sustainability programs can improve customer perceptions and loyalty. Such initiatives resonate with customers increasingly concerned about environmental issues.

Third, Social Responsibility Programs: Although SL exhibits a smaller effect, it remains vital to integrate fair labor practices, community involvement, and cultural diversity initiatives to create a well-rounded ESG strategy.

Fourth, Customer Experience as a Mediator: Efforts should be made to enhance customer experience through superior service quality, clear communication, and value delivery. CE acts as a powerful mediator, maximizing the impact of ESG practices on CL.

Fifth, Regional Adaptation: Tailoring ESG strategies to the socio-economic context of Dong Nai Province will ensure greater relevance and effectiveness.

Despite its contributions, the study has limitations. First, it is geographically restricted to Dong Nai Province, limiting the generalizability of findings to other regions or industries. Second, the cross-sectional design captures relationships at a single point in time, preventing analysis of long-term trends or causality. Third, the study relies on self-reported data, which may introduce biases such as social desirability or common method variance. Finally, while the sample size of 323 is sufficient for statistical analysis, a larger sample could provide more robust and generalizable insights.

Future studies should expand the geographic scope to include other regions and industries to test the generalizability of the findings. Longitudinal research designs would enable exploration of causality and long-term effects of ESG practices on CE and CL. Additionally, incorporating qualitative methods, such as interviews or focus groups, could provide deeper insights into customer perceptions of ESG initiatives. Finally, future research could explore the role of industry-specific factors and technological advancements, such as digital transformation, in enhancing the effectiveness of ESG practices.

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EFFECTS OF MANAGERIAL COACHING ON JOB PERFORMANCE OF SOCIAL IMPACT BUSINESSES' EMPLOYEES THROUGH THE MEDIATING ROLE OF ORGANIZATIONAL COMMITMENT

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ABSTRACT

This study provides empirical evidence for the effects of managerial coaching on job performance of Vietnamese SIB's employee. The study collected data from 100 employees working in SIBs all over Vietnam. After analyzing the data using SmartPLS4 software, the empirical results show that managerial coaching has a direct positive effect on job performance. Moreover, the results also indicate that there was an indirect positive relationship between managerial coaching and job performance through the mediating role of organizational commitment. This research provides valuable insights for academic and practical purposes. By providing empirical evidence on the positive effects of managerial coaching on job performance and organizational commitment, the study is a good reference in shaping more effective application of managerial coaching as well as management strategies. Practical recommendations are also proposed to enhance managerial coaching practices, improve human resources management, and promote overall organizational performance, especially for SIBs.

Keyword: coaching, job performance, managerial coaching, organizational commitment, SIBs

1. INTRODUCTION

The global market's evolution presents challenges for Vietnamese businesses, which must manage human resources effectively for sustainable growth. Eisenstat (1996) emphasizes HR's role in integrating sustainability into organizational interactions, while Thornhill (1998) stresses involving line managers in HR practices. Line managers need to align HR practices with strategic goals set by senior management to manage people effectively and support organizational success.

Managerial coaching, where line managers actively engage in coaching activities (Beattie et al., 2014), helps employees enhance performance and skill development. It fosters better relationships, trust, creativity, and adaptability (McCarthy and Milner, 2020). Most managers support employee training, making coaching advantageous for both parties (CIPD, 2015). Although global studies have extensively examined managerial coaching's impact on organizational outcomes such as job performance, role clarity, and employee commitment, several unaddressed aspects remain in the Vietnamese context, including its role in enhancing the effectiveness of Social Impact Businesses (SIBs), thereby contributing to the achievement of the United Nations Sustainable Development Goals (SDGs). First, the unique socio-economic and cultural dynamics of Vietnam, particularly in SIBs, are under-explored. The limited empirical research in Vietnam often focuses on traditional sectors, leaving a gap in understanding how managerial coaching functions in mission-driven organizations like SIBs (Chinh, 2018; Vu, 2019). Second, the indirect effects of managerial coaching through mediators like role clarity, job satisfaction, and organizational commitment have not been comprehensively studied within the Vietnamese context. Third, there is a lack of quantitative analyses employing advanced models, such as Structural Equation Modeling, to investigate these relationships systematically (Kim et al., 2013; Raza et al., 2017).

In response to this gap, the authors are conducting a study to explore the impact of managerial coaching on employee job performance in Vietnamese social impact businesses (SIBs) by addressing two key questions: the effect of managerial coaching on job performance through the mediator of organizational commitment, and recommendations for SIBs to improve efficiency through coaching. The study theoretically enriches the literature by introducing a contextualized model of managerial coaching's impact, validating constructs like organizational commitment and job performance within the SIB context. It also bridges research gaps by exploring socio-economic and cultural dynamics specific to Vietnam and investigating the indirect effects of managerial coaching through mediators like role clarity and job satisfaction, which

are under-explored in local research. Practically, the research provides actionable recommendations for SIB leaders to improve managerial coaching practices, enhance employee performance, and foster a supportive workplace culture.

2. LITERATURE REVIEW

2.1. Managerial Coaching

2.1.1. Definition of Managerial Coaching

To fully understand the concept of managerial coaching, it is first necessary to analyze the concept of coaching, which serves as the overarching concept for 'managerial coaching. In general, coaching is an ongoing, collaborative process between a coach and an individual (coachee) aimed at promoting learning and development across various areas (Allenbaugh, 1983). The act of coaching can help in acquiring new job skills, refining current ones, enhancing job satisfaction, and building positive work cultures. By creating a supportive working environment, coaching plays as a stimulus for both personal and professional growth (DeRue & Ashford, 2011; Giberson & Mitchell, 2015).

From the foundation of coaching, managerial coaching places great emphasis on the interaction between managers and their workers. In this context, the manager adopts the role of a coach or a facilitator to foster the performance and development of individuals or a team (Ellinger et al., 2003; Heslin et al., 2006). The collaborative approach involves more than just providing instructions. It includes setting clear expectations, offering constructive feedback and directions, and, crucially, empowering them to take responsibility for their missions and tackle challenges. Ultimately, the goal of managerial coaching is building a collaborative environment where employees can develop their potential, thereby contributing to both their personal growth and the development of the organization (DeRue & Ashford, 2011; Giberson & Mitchell, 2015). The International Coaching Federation (2023) has the same conclusion. They emphasized that managerial coaching promotes a collaborative route, in which managers serve as guides to assist their team members attain their maximum potential.

To sum up, the definition of managerial coaching is developed from the concept of coaching. Basically, managerial coaching refers to coaching activities carried out by managers in an organization (Kim et al., 2013). One of the most popular types of managerial coaching is hierarchical coaching, where line managers will take a direct role in training their subordinates. This approach has attracted many researchers and is widely acknowledged in business environments. For this reason, our study will focus on managerial coaching through the lens of hierarchical coaching, adopting the framework developed by Heslin et al. (2006). Thus, the focus of this research will be on managerial coaching as a practice where line managers take the role of coach and employees act as coachees, with the aim of enhancing employee development and performance.

2.1.2. Benefits of Managerial Coaching

Managerial coaching provides a personalized method of coaching which goes beyond the one-size-fits-all approach. This way of coaching helps the organization to recognize the distinct potential of both individuals and organizations. Therefore, managers who apply diverse formats of coaching will fully leverage the power of these developmental tools and enhance their workers' performance.

Managerial coaching also plays a vital role in embedding sustainability within organizations by fostering innovation, resilience, and ethical responsibility. Coaching enhances employees’ awareness of sustainable practices, encouraging actions such as reducing resource waste and developing eco-friendly solutions (Beattie et al., 2014). It aligns employee behaviors with organizational sustainability goals, improving job performance and cultivating accountability (McCarthy & Milner, 2020). Moreover, managerial coaching promotes employee engagement and organizational citizenship behaviors by enhancing employees' perception of organizational investment in their development, which thereby strengthening their commitment and job performance (Wangchuk et al., 2024). Depending on the type of coaching, the benefits of this activity for employees and the organization are different. Managers can set measurable sustainability objectives and track progress through coaching frameworks, while peer coaching encourages collaboration on sustainability initiatives, driving innovation and reinforcing commitment (Ladyshewsky, 2010).

Specifically, group coaching offers numerous benefits for personal and professional development by fostering a collaborative learning environment. Participants share experiences and perspectives, enriching their understanding and

enhancing problem-solving skills (Hamlin et al., 2009). DeRue and Ashford (2011) emphasize that group coaching fosters a sense of community and shared responsibility, while constructive peer feedback encourages higher performance and personal growth.

With individual coaching, on the other hand, focuses on personalized development, enabling participants to deepen self-awareness and target specific areas for improvement (Hamlin et al., 2009). Guided reflection helps individuals better understand their strengths and challenges (Boyatzis, Smith, & Blaize, 2006), while the one-on-one format provides tailored feedback and continuous support, expediting learning and behavior adaptation (Smither, London, & Reilly, 2005).

Finally, peer coaching promotes collaborative learning by creating a supportive, goal-oriented environment. This method strengthens interpersonal relationships and teamwork by encouraging open communication and trust, free from hierarchical pressures (Parker, Hall, & Kram, 2008; Ladyshewsky, 2010). Peer coaching also broadens perspectives, enhances mutual understanding, and develops key leadership skills like active listening and effective feedback (Hamlin et al., 2009; Daloz, 2015).

2.2. Job performance

2.2.1. Definition of job performance

One of the earliest theories on job performance was proposed by Campbell (1990), which indicates that job performance is considered an individual-level variable that reflects what a person does in their job. Job performance is influenced by three main factors: declarative knowledge, procedural knowledge and skills, and motivation. Declarative knowledge refers to understanding of the tasks and responsibilities associated with a job. Procedural knowledge and skills involve knowing how to perform these tasks effectively, including cognitive and interpersonal skills. Motivation reflects the choices individuals make regarding the effort they make, the level of effort, and the persistence of that effort. Besides that, Motowidlo and Kell (2003) define job performance as the expected cumulative benefit to the organization. This definition considers the broader impact of an individual's actions over time, which means that job performance should be evaluated not just on immediate outputs but also on long-term contributions to organizational success. The concept of "anticipated benefit" suggests the idea that job performance includes potential future benefits arising from current behaviors of the employee. Ivancevich et al., (2013) also suggest the definition based on the combination of ability, opportunity, and willingness. To be specific, "ability" refers to the inherent skills and competencies an individual possesses, "opportunity" involves the external conditions and support available, and "willingness" indicates the employee's motivation and attitude toward completing tasks. This framework suggests that job performance is not only about what employees can do but also what they are willing to do under the right conditions. Meanwhile, according to Alqarni et al. (2023), job performance can be categorized into three levels: individual, group, and organizational, each further divided into process performance, which focuses on how tasks are carried out, and outcome performance, which assesses the results achieved.

2.2.2. Importance of job performance

According to research by Torrington and Hall (1995), the measurement of job performance through the quantity of goods and services produced is fundamental for evaluating overall productivity within a specific time period. High levels of job performance ensure that organizational resources are utilized efficiently, leading to better output, and increased profitability. Second, Campbell (1990) suggests the significance of job performance in enhancing employee motivation and job satisfaction. When employees perceive that their contributions are valuable and recognized, it positively impacts their motivation, leading to higher levels of engagement and job satisfaction. This positive feedback encourages employees to continue performing well, creating a motivated workforce. Moreover, the alignment of individual goals with organizational objectives create a sense of purpose and fulfillment among employees, further enhancing their job satisfaction and loyalty to the organization. Finally, job performance also plays a vital role in shaping organizational climate and culture. A study by Meyer and Peng (2005) indicated that job performance includes both productive and counterproductive behaviors. Productive job performance contributes to a positive organizational culture by setting standards for behavior and work ethic. In contrast, counterproductive behaviors can worsen morale and trust of the organization. Organizations that prioritize and cultivate high job performance tend to encourage a climate of excellence and accountability, which supports a strong, cohesive organizational culture that contributes to the long-term success of

the organization.

2.3. Organizational Commitment

2.3.1. Definition of Organizational Commitment

Organizational commitment has long been a central topic in understanding employees' behavior and its impact on business success. Becker's Side-Bet Theory (1960) is one of the foundational theories in this area, proposing that employees remain in an organization due to the "side-bets" or investments they accumulate over time. These investments, such as time, skills, resources, and effort, create a perceived cost of leaving. According to Becker, employees are bound to their organizations not only by emotional attachment but also by a rational analysis to avoid the loss of these investments, making their commitment more transactional in nature.

O'Reilly and Chatman (1986) introduced the concept of psychological attachment, viewing organizational commitment as the extent to which employees internalize or adopt the organization's values and goals. They identified three mechanisms: compliance, where commitment is driven by external incentives; identification, where individuals seek affiliation with the organization; and internalization, where personal values align with organizational ideals. This framework emphasizes how varied motivations shape an employee's sense of commitment.

In addition, Schermerhorn et al. (2010) later emphasized organizational commitment as a reflection of employee loyalty, expressed through alignment with organizational values, dedication to achieving its goals, and a willingness to contribute effort. High levels of commitment are associated with a positive work environment, where employees are motivated to exceed expectations and support the organization's success.

2.3.2. Outcomes of Organizational Commitment

Organizational commitment is a key driver of positive workplace performance, with one of its most notable effects being the reduction in turnover rate. Employees with strong commitment are less likely to leave their organizations, resulting in lower recruitment and training expenses. This retention helps maintain institutional knowledge and ensures operational continuity, minimizing the challenges associated with frequent staff changes (Mathieu & Zajac, 1990; Zheng et al., 2010). Such stability contributes to smoother organizational operations and greater overall efficiency.

Another important impact of organizational commitment is its ability to enhance job performance as employees who feel committed to their organization are more likely to exhibit higher levels of effort and productivity (Wang et al., 2022). Employees who are committed to their organizations are often more engaged, motivated, and willing to go beyond their defined responsibilities to support organizational objectives. Research indicates that this sense of dedication fosters increased productivity, as committed employees are more likely to align their efforts with the organization's strategic goals (Meyer & Allen, 1997).

In Social Impact Businesses (SIBs), organizational commitment takes on an even greater significance. SIBs aim to balance social and financial goals, and employees' alignment with these dual missions is crucial. Commitment in this setting often arises from the unique combination of personal fulfillment, emotional attachment, and the desire to contribute to broader societal outcomes. Employees who strongly identify with their organization's social mission tend to exhibit higher levels of affective and normative commitment, further boosting job satisfaction and performance (Ghulam et al., 2019).

Job satisfaction is also closely correlated with organizational commitment. Employees who exhibit high commitment levels often report higher satisfaction with both the nature of their work and the rewards they receive. This satisfaction not only improves morale but also strengthens their emotional connection to the organization, reducing the desire to seek opportunities elsewhere (Schermerhorn et al., 2010; Meyer et al., 2002; Gautam et al., 2004).

2.4. Overview of SIBs and application of Managerial Coaching at SIBs in Vietnam

Social Impact Businesses (SIBs) can be defined as a new type of enterprise that has surfaced in the dynamic corporate landscape of today. These organizations go beyond merely seeking profit; they strive to maintain financial stability while simultaneously creating positive social and environmental impacts (Austin et al., 2006). This dual mission sets SIBs apart from traditional for-profit firms, as they integrate societal well-being into the core of their operations. These businesses focus on addressing social challenges such as poverty, healthcare access, and environmental degradation, aligning

naturally with ESG's pillars: environmental stewardship, social equity, and strong governance (Truong et al., 2018). Both SIBs and ESG contribute to creating resilience in business models by addressing long-term risks and opportunities. In consideration of social issues, SIBs make significant contributions to addressing problems including poverty alleviation, healthcare access, and environment degradation. Focusing on these areas, SIBs give a hand to a more equitable and sustainable world (Moser, 2019). ESG principles are also suggested as global framework and standardized metrics that enable SIBs to assess, report, and improve their impact systematically. This approach is particularly valuable for SIBs, allowing them to attract green financing, meet international sustainability benchmarks, and build credibility with stakeholders (PwC Vietnam, 2023). The mutual reinforcement between SIB and ESG ensures that SIBs remain at the forefront of sustainable development efforts, leveraging ESG principles to scale their impact, build trust with stakeholders, and contribute to a more inclusive economy.

From an operational viewpoint, ESG acts as a catalyst for SIBs, encouraging innovation and resilience. SIBs can embed ESG principles in order to develop scalable solutions, such as renewable energy adoption or waste management systems, that address systemic challenges while maintaining financial sustainability (UNDP, 2023). Moreover, ESG emphasizes robust governance, which supports SIBs in managing risks, fostering accountability, and ensuring ethical decision-making (Moser, 2019). This alignment not only enhances the operational efficiency of SIBs but also positions them as leaders in sustainable business practices, particularly in sectors such as agriculture, forestry, and fisheries, where ESG and SIB missions converge (Truong et al., 2018).

In addition, ESG frameworks enable SIBs to measure their success transparently through key performance indicators like carbon footprint reduction, community development, or gender equality advancements. These measurable outcomes attract impact investors and other stakeholders who prioritize social and environmental returns alongside financial gains (PwC Vietnam, 2023). As ESG principles gain global attraction, SIBs that adopt these standards are better equipped to scale their impact and align with international development goals such as the United Nations' Sustainable Development Goals (UNDP, 2015). For these reasons, the synergy between SIBs and ESG will ensure the amplification their collective missions. In Vietnam, SIBs are a type of business that has received increasing attention in recent years.

Regarding the scale, around 26,027 of active businesses are SIBs, representing 3% of the total number of businesses in Vietnam in 2021. About 46.6% of SIBs operate in the agriculture, forestry and fisheries sector. In the Vietnamese context, the primary legal form of SIBs is enterprises. In Vietnam, 84% of SIBs are registered under the Enterprise Law, with 72% registered as for-profit enterprises and 12% as social enterprises (Truong et al., 2018).

In terms of the contribution of the SIBs sector to economic, social, and environmental development, SIBs represent a model that promotes sustainable business practices and offers effective solutions for the Vietnamese government in addressing challenges. SIBs have been engaged in resolving a wide range of social issues, including poverty alleviation, healthcare access, energy, education, and gender equality, etc. For instance, SIBs provide business solutions for low-income individuals and operate as locally-focused business models (Truong et al., 2018). The community is supported by microfinance tools that provide low-cost financial access to impoverished households. Also, SIBs work in tandem with other economic and social development programs to address hunger and poverty. In the educational aspect, the private education sector is actively involved in alleviating overcrowding in public schools and improving the quality of education. However, in Vietnam, there are virtually no businesses engaged in climate change mitigation activities due to the macro nature of the problem and the scale of required solutions. Therefore, this area may represent a potential opportunity for social impact startups that use technology, including solutions for climate change adaptation and disaster risk reduction.

Regarding the application of managerial coaching in SIBs, in the first phase of the "Social Impact Business Innovation Champion Launchpad" (SIB ICL) of ISEE-Covid project, funded by Global Affairs Canada (GAC) and implemented by the United Nations Development Program (UNDP) in collaboration with the Agency for Enterprise Development (AED) under the Ministry of Planning and Investment, managerial coaching was chosen to enhance the capabilities of Social Impact Businesses (SIBs). This was conducted under the collaboration with FTU Innovation and Incubation Space (FIIS) in which 52 SIB Champions completed over 700 high-quality coaching sessions for more than 120 SIBs across Vietnam (UNDP, 2023). With the knowledge and experience gained from the SIB ICL program, these top managers have effectively applied managerial coaching within their own businesses, resulting in substantial

improvement in personnel capacities. Despite the promising outcomes, there is still no official study in Vietnam that evaluates the influence of managerial coaching on employee performance in SIBs.

2.5. Proposed Research Model

This study will adapt the research model proposed by Kim et al. (2013) due to its alignment with the study's objectives and its relevance to the Asian context. The following model explores the direct relationship between Managerial Coaching and Job Performance, as well as the indirect relationship between Managerial Coaching and Job Performance mediated by Organizational Commitment.

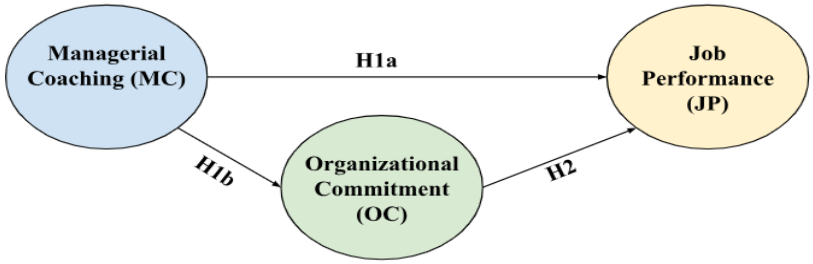


Figure 1. Proposed Research Model

Source: Suggested by the authors (2024)

2.6. Research hypothesis

Organizational Commitment

Grusky (1966), one of the pioneers in studying organizational commitment, has defined this concept as a "strength of the bond between a person and an organization". Besides, organizational commitment also refers to the employee's loyalty towards their organizations (Schermerhorn et al., 2010) or the desire to work in long term with that organization (Meyer and Allen, 1997). Previous studies have revealed that the level of commitment positively correlates with the productivity and employee retention (Ferris and Aranya, 1983; Culverson, 2002; Brown, 2003; Gautam et al., 2004).

Meanwhile, organizational commitment can be tailored through managerial coaching. A study by Meyer and Allen claimed that supporting and inspiring employees via coaching activities can enhance employee's confidence, thus improving their commitment to the organization. This conclusion is also supported by numerous empirical studies from Park (2007), Kim et al (2013), and Kalkavan and Katrinli (2014). Therefore, we propose the research hypothesis as followed:

H1b: Managerial coaching positively affects organizational commitment

H2: Organizational commitment positively affects job performance

Job Performance

According to Meyer & Peng (2005), job performance is the employee's outcomes which can be seen as productive or counterproductive within an organization. Performance can also be measured based on the amount of goods and services produced within a time limit. It is individual's skills, competence, opportunities, and willingness to complete tasks that determine the job performance (Ivancevich et al., 2005).

In numerous empirical research, managerial coaching denotes its direct and indirect relationship with job performance (Kalkavan and Katrinli (2014); Raza et al., (2017); Kim (2010); Kim et al., (2013)). Consequently, authors propose the research hypothesis as followed:

H1a: Managerial coaching positively affects job performance

3. RESEARCH METHODOLOGY

3.1. Data Collection and Sampling

The authors used a convenient non-probability sampling method for collecting data. The research was carried out from September 2023 to March 2024. Data used in the research is primary data collected through quantitative methods using a Google Form survey from December 15th, 2023 to February 15th, 2024. The minimum sample size follows the "10 times rule" in PLS-SEM, requiring at least 40 samples, as "Job Performance" has four structural paths (Hair et al.,

2013). Respondents filling in the survey form are employees from SIBs in Vietnam. There were 102 respondents in total, both online and offline working at Social Impact Businesses (SIBs) in Vietnam. After cleaning the data to remove incomplete or unreliable responses, the authors retained 100 valid samples, which is adequate for the subsequent research phases.

3.2. Methodology

Statistical analyses were performed using the SmartPLS4 software package. Descriptive statistics, including the calculation of means and standard deviations, were computed to characterize the data, while the relationships between variables were examined through a correlation matrix. To evaluate reflective measurement models, the authors used Conbach's alpha to test reliability, the loading of a measurement index to measure the correlation between the indicator and the latent variable, average variance extracted (AVE) to measure convergent validity, HTMT ratio, and the Fornell-Larcker criterion (Fornell & Larcker, 1981) to measure discriminant validity.

For data modeling, the authors analyzed the relationships between variables using a PLS-SEM model. Predictive accuracy of the model was assessed using R-squared values, following the guidelines of Shmueli and Koppius (2011) and Rigdon (2012). Effect sizes (f2) were calculated to quantify the strength of the relationships between independent and dependent variables. The statistical significance of these relationships was determined using p-values.

4. RESULTS AND DISCUSSION

4.1. Effects of Managerial Coaching on Job performance and Organizational Commitment in SIBs

This research collected data from 100 employees of SIBs in Vietnam using Five-point Likert scale. The majority of respondents (62.9%) were aged between 30 and 45 years, with the next largest group (30.6%) being 30 years old. Fewer respondents were in the 45-60 age range (4.2%) and over 60 (2.3%). The sample was predominantly female (78.3%), with males representing 21.7%. In terms of experience, 34.8% had been with the company for only one year, 26.1% had 1-3 years, and another 26.1% had over 5 years. The remaining 13% had 3-5 years of experience.

The survey also assessed the application of managerial coaching in SIBs. It revealed that more than half (56.5%) conducted coaching sessions twice a year, with most sessions lasting 1-2 hours (65.2%). Individual coaching was the prevalent method (95.7%). Employees reported high satisfaction with coaching, with over 60% finding their coaches trustworthy, responsive, empathetic, and reliable. However, limitations were noted: about 22% of SIBs rarely used coaching, and group or peer coaching methods had less than 50% adoption.

The respondents agreed marginally with all nine criteria of Managerial Coaching (MC), with the most favored was the coach's belief in the coachee's improvement and growth (MC8) with a mean value of 4.16, and the least favored was the coach as a consultant to assist the coachee in developing their ideas (MC5) at 3.66.

For Job Performance (JP), employees were slightly dissatisfied with this criterion, with scores ranging from 2.96 for good job performance compared to colleagues (JP1) to 3.91 for on-time work completion (JP3).

For Organizational Commitment (OC), employees generally showed mild disagreement with these criteria, as all mean values were slightly above 2.9. The highest-rated criterion was that the organization holds significant personal meaning for employees (OC5), with an average rating of only 3.72.

Table 1. Descriptive statistics of the variables measured by Likert scale

	Mean	Median	Observed min	Observed max	Standard deviation	Number of observations used
MC1	3.73	4.0	2	5	0.679	100
MC2	3.87	4.0	2	5	0.895	100
MC3	3.97	4.0	2	5	0.784	100
MC4	4.08	4.0	1	5	0.961	100
MC5	3.66	4.0	1	5	0.831	100

MC6	4.06	4.0	1	5	0.951	100
MC8	4.16	4.0	1	5	0.950	100
MC9	4.0	4.0	1	5	0.985	100
MC10	3.86	4.0	1	5	0.932	100
JP1	2.96	4.0	2	5	0.78	100
JP2	3.65	4.0	2	5	0.809	100
JP3	3.91	4.0	2	5	0.780	100
JP4	3.66	4.0	2	5	0.699	100
JP5	3.68	4.0	2	5	0.665	100
OC1	3.46	3.5	1	5	0.915	100
OC2	3.7	4.0	1	5	1.02	100
OC3	2.98	3.0	1	5	1.00	100
OC4	2.92	3.0	1	5	1.012	100
OC5	3.72	4.0	1	5	0.954	100
OC6	2.96	3.0	1	5	1.034	100

Source: Results from SmartPLS4 (2024)

This study analyzed data by Structural equation modeling (SEM) using Smart-PLS4 software. The analysis of data collected from the survey revealed a positive correlation between managerial coaching and job performance. The results of the study also showed a positive relationship of this variable on job performance. The hypothesis testing results is presented in the following table:

Table 2. Results of hypothesis testing

	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (O|STDEV)**	**P value**	**Hypothesis testing**
MC → JP	0.315	0.295	0.143	2.198	0.028	Supported
OC → JP	0.315	0.326	0.140	2.255	0.024	Supported

Source: Results from SmartPLS4 (2024)

The hypothesis testing results indicate that both hypotheses were supported. For the relationship between Managerial Coaching (MC) and Job Performance (JP), the P value was 0.028, which is below the 0.05 threshold, confirming that the hypothesis is statistically significant. Similarly, the P value for the relationship between Organizational Culture (OC) and Job Performance (JP) was 0.024, also below the 0.05 threshold, supporting the hypothesis. These findings suggest that both managerial coaching and organizational commitment have a significant impact on job performance.

4.2. Discussion

These results are consistent with previous studies (Kalkavan and Katrina, 2014; Kim, 2010; Kim et al., 2013; Raza et al., 2017), the findings show that employees who receive excellent coaching from their managers perform better in their roles. This emphasizes the importance of managerial coaching in improving employee effectiveness and productivity inside firms. Moreover, the data also shows that organizational commitment and job performance are positively related. Employees with higher levels of organizational commitment performed better on the job. This finding is consistent with earlier studies indicating that devoted individuals are more likely to put out effort and attention to their jobs, resulting in better performance outcomes (Ferris and Aranya, 1983; Culverson, 2002; Brown, 2003; Gautam et al., 2004).

Organizations that promote a strong sense of commitment among their employees are more likely to achieve high levels of job performance and productivity. This study confirms managerial coaching boosts job performance and organizational commitment in Vietnamese SIBs, aligning with prior findings (Kim et al., 2013; Raza et al., 2017). However, while earlier research focused on corporate sectors, our work highlights coaching's amplified impact in mission-driven SIBs, where social goals deepen employee engagement. Unlike Kalkavan & Katrinli (2014), who linked coaching to job satisfaction, we quantify commitment as a key mediator—a novel insight for Vietnam's context. Practically, this underscores how tailored coaching in SIBs can enhance both productivity and loyalty, offering a model for socially conscious firms in emerging economies.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study investigates the effects of managerial coaching on the job performance of employees in Social Impact Businesses (SIBs), through the mediating role of organizational commitment. Descriptive results indicate that employees rated their direct managers' coaching highly, with an average score of 3.97 out of 5. The study's findings support existing theories from the literature and align with previous research by scholars such as Kalkavan and Katrina (2014), Kim (2010), Kim et al. (2013), Raza et al. (2017), Ferris and Aranya (1983); Culverson (2002), Brown (2003), Gautam et al. (2004). Specifically, managerial coaching positively affects organizational commitment. However, the relationship between managerial coaching and job performance is slightly stronger with a coefficient of 0.028. In addition, the data also reveals that there is a positive link between organizational commitment and job performance. The stronger organizational commitment tends to increase the employees' job performance.

Considering the research context domestically and internationally, the authors identified that this research article offers several contributions. Firstly, the authors chose research variables grounded in existing empirical studies in Vietnam, complemented by notable international studies, resulting in a research model that is more diverse and appropriate than previous ones. Secondly, the research is closely developed based on theoretical basis and consolidated by experimental results, thereby strengthening the theoretical foundation for related future studies in Vietnam. Thirdly, the research serves as a reliable reference for leaders and managers to evaluate and implement managerial coaching in their businesses.

5.2. Recommendations

Based on the study's findings and their implications, there are some recommendations for Vietnamese SIBs.

According to the recommendations from the survey on improving managerial coaching activities in SIBs, most respondents highlighted the need for coaches to listen with greater empathy and sincerity. They emphasized that coaches should be more empathic by taking into account their workload and work-related stress. Additionally, some respondents suggested that coaching sessions should be better prepared and organized. These expectations can be met by addressing the gaps in the coach's skills and knowledge about effective coaching.

Firstly, to enhance the effectiveness of managers as coaches, it is important to invest in specialized training programs and workshops. The organizations should focus on providing managers with the necessary skills, techniques, and frameworks for effective coaching. McCarthy (2013) found that managers often receive coaching training that is too similar to that given to full-time coaches, without addressing the unique needs of managerial roles. To address this, training should emphasize interpersonal skills crucial for coaching, such as active listening, effective questioning, goal setting, observation, and providing constructive feedback, rather than just adhering to a fixed coaching framework. Moreover, Connor and Pokora (2007) stress the importance of using coaching frameworks as guides rather than strict rules, allowing for flexibility and adaptation. By tailoring coaching practices to the specific contexts and challenges faced by managerial coaches, organizations can create more effective coaching strategies that meet the needs of both the managers and their team members.

Secondly, SIBs should enhance their coaching practices through partnering with external coaching expertise to offer diverse methods that resolve the specific needs and challenges facing their managers. An example of this approach is the

ISEE-Covid project, a collaboration between the Ministry of Foreign Affairs of Canada (GAC), UNDP, the Agency for Enterprise Development (AED), and the Ministry of Planning and Investment. Engaging with external training providers who recognize the need for context-specific adjustments can lead to more effective outcomes (Megginson & Clutterbuck, 2009).

Finally, SIBs should promote open lines of communication between managers and employees, creating an environment that supports managerial coaching. Encouraging regular dialogue and mutual understanding can strengthen the coaching relationship, thereby improving employee performance, satisfaction, and commitment. For instance, establishing frequent team meetings to encourage employees to share their challenges and receive feedback can enhance collaboration and knowledge sharing. According to Ladyshewsky (2010), managerial coaching should go beyond just coaching skills to include emotional intelligence, trust-building, understanding values, and reflecting on the manager's role in staff development. Additionally, implementing peer coaching—where employees from different departments or levels provide feedback and support each other—can offer unique perspectives that complement managerial coaching.

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DEVELOPING APPLE PAY USAGE IN VIETNAM: POTENTIALS AND CHALLENGES

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ABSTRACT

In these days, mobile payments have played a crucial role in daily activities with the support of current developments in technology. Particularly, Apple Pay mobile payment system has become one of important payment methods all over the world with the aim of providing iPhone user with the most advanced technology experience called near field communication (NFC). The article aims to understand the overview of Apple Pay payment and development situation of Apple Pay among other mobile payment methods in Vietnam as well as clarify the potentials and challenges in developing the usage of Apple Pay in the long term.

Keywords: "Apple Pay", "Mobile Payment"; "Near Field Communication"; "Vietnam"

1. INTRODUCTION

Slade et al., (2015) proposed that mobile payments comprise many transaction types such as online payments, peer-to-peer transfers, and contactless payment. Moreover, the transaction value of the mobile Point-Of-Sale (POS) payments was predicted to reach USD 5.4 trillion by 2024 (Statista, 2023). Regarding Apple's annual report in 2023, the global transactions calculated at USD 6 trillion in 2022 although Apple Pay has a life of around 10 years.

Nowadays, the mobile payment systems are closely related to the developments of cutting-edge technologies. There are a few technologies applied on mobile payments as Unstructured Supplementary Service Data (USSD), Voice Services, Short Message Service (SMS), and Near Field Communication (NFC) (Cabanillas et al., 2020). However, NFC technology which is the main choice for the mobile phone sector because of its convenience in payment (Cabanillas et al., 2020).

Apple Pay allows users to connect their iPhone or Apple Watch to debit or credit cards or even mobile banking applications, and biometric authorization methods will be implemented to support users conduct their transactions fast, secure, and convenient. In terms of Vietnam market, Apple Pay is one of the newest and youngest forms of payments because Apple only launched Apple Pay for Vietnamese users in August, 2023 (Appleininsider, 2023). Additionally, Apple Pay only accepted in 13 commercial banks in Vietnam (Apple, 2025), meaning that Apple users who have bank accounts from other commercial banks cannot experience this function on their devices. The debut of Apple Pay in Vietnam, however, played an important role in enhancing digital transformation capabilities and striving for the process of cashless society in Vietnam.

2. METHOD

The article employs theoretical analysis and synthesis methods, so we are able to collect scientific information on the prior and existing research to make important contributions to bankers, policy markers, and marketers. Furthermore, this research will clarify basic concepts of Apple Pay payment in Vietnam as well as summarizing the potentials and challenges in Vietnam market. From these points, we could propose several recommendations to develop Apple Pay usage in Vietnam in the future.

3. RESULTS AND DISCUSSIONS

3.1. Apple Pay overview

In 2014, Apple debuted Apple Pay which was a new category of service in order to provide a mobile payment service with an easy, secure and private way to pay (Apple). Apple Pay decided to use a NFC antenna design which is a dedicated chip to ensure the security through Touch ID, and Face ID these days. (Apple) iOS users can use their credit and debit cards from three different payment networks as American Express, MasterCard and Visa issued by banks. According to Eddy Cue-Apple's senior vice president of Internet Software and Services, the core of Apple Pay is privacy and security,

so users can freely utilize their cards without worrying about card or personal information. Therefore, this form of payment can help us reduce and minimize the potential of fraud and risks in the future. Additionally, Apple respects user's privacy, so they are not likely to collect the purchase history. Apple also provides Find My IPhone function to support iOS users postpone their payments quickly in case the iPhone is lost. (Apple)

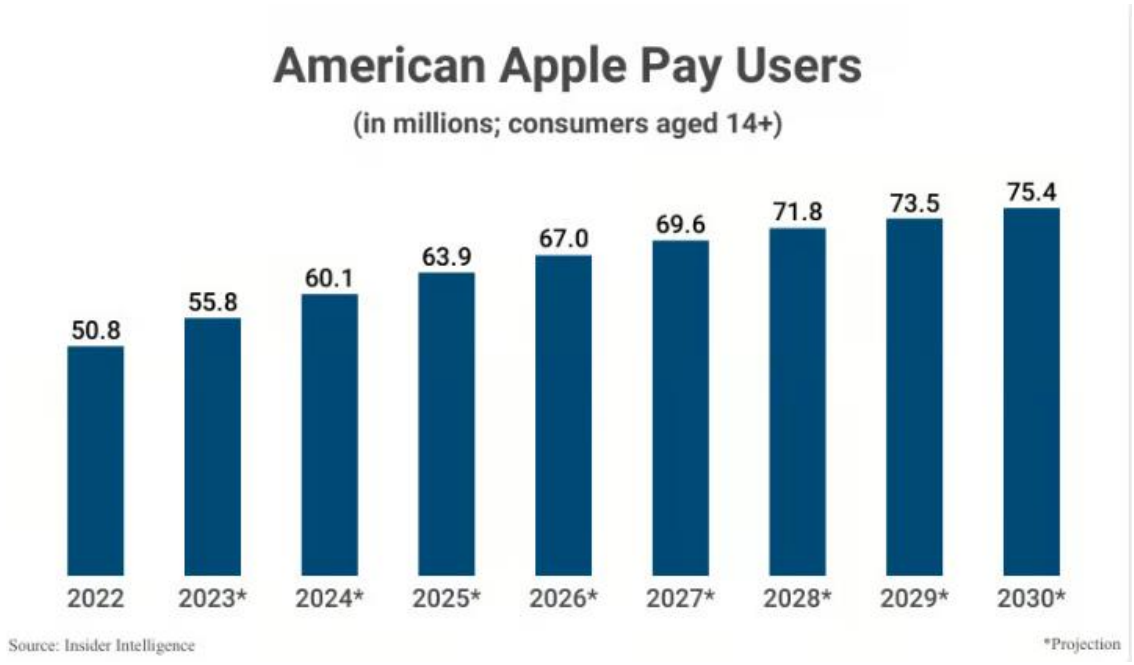


Chart 1 American Apple Pay Users (2022 – 2030)

Regarding Apple Pay Statistics from Insider Intelligence in 2024, Apple Pay users accounted for around 18% of America population (approximately 60 million), and this number was predicted to reach over 75 million consumers by 2030.

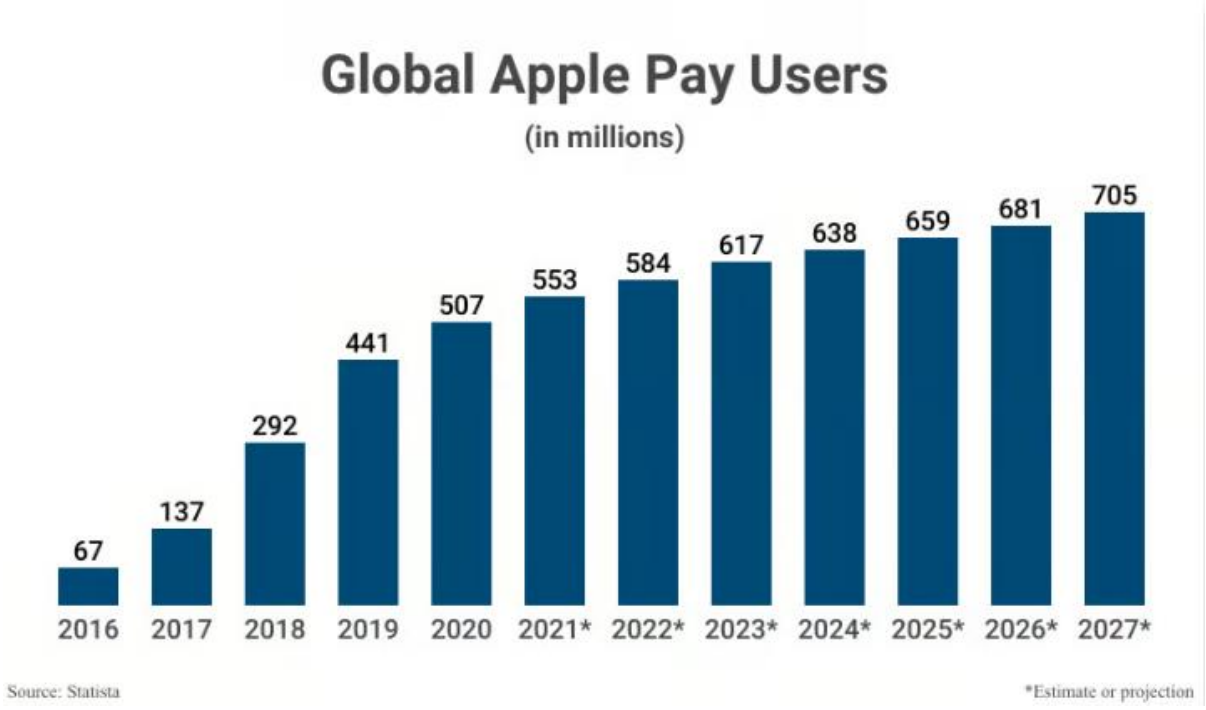


Chart 2: Global Apple Pay Users (2016 – 2027)

In terms of Apple Pay consumers, Apple Pay is now present in 83 countries, recording an estimated global user base of 630 million, and this amount was projected to hit over 700 million people by 2027. (Apple Pay Statistics, 2025)



Chart 3: Apple Pay International Penetration Rates

These days, many organizations accept Apple Pay globally, especially in online stores, and small businesses with fewer than 10 employees. According Statista, there are nearly 600.000 companies worldwide that accept payments via Apple Pay. Moreover, the international penetration rates of Apple are extremely high in top 5 countries, so we can easily determine that the penetration rates for Point of sale in these countries recorded over 50%. This means the rates for in-store Apple Pay consumers is the majority worldwide. (Apple Pay Statistics, 2025)

Apple Pay is the most popular choice for younger consumers with young users born from 1997 to 2012 – Generation Z (73.1%), and they tend to use Apple Pay at least once a week, following by Millennials who were born between 1981 and 1996 accounted over 51% of digital wallet users. (Insider Intelligence)

– Overview of some studies on Apple Pay around the world

No.	Author	Country	Variables	Method	Findings
1	Finken and Heiduck (2021)	Germany	Brand perception, sociodemographic, and technology acceptance	Qualitative	Showing significant difference Apple Pay users and non-users about mobile payment risk, security, and social influences.
2	Liebana-Cabanillas et al. (2020)	Spain	Mobile user skillfulness, personal innovation, convenience and perceived risk were added to TAM and UTAUT model	Quantitative	Risk tend to predict Apple Pay intent whereas personal information and effort expectation do not
3	Liu and Zhou (2017)	China	Effort expectancy, perceived control, and focused attention affect user's intention using the UTAUT model	Quantitative	All three factors that authors added to the model positively affect user's intention to continue to use the service

Source: author's own compilation

3.2. Apple Pay in Vietnam

As reported by Apple, Vietnam is the third country in Southeast Asia to authenticate Apple Pay become an official form of mobile payment after Malaysia and Singapore. In Vietnam, Apple Pay launched in 2023 is one of the youngest mobile payments, because it arrived after Samsung Pay (2017) and Google Wallet (2022). Recently, iPhone users can add their bank cards information to Apple Pay through mobile banking apps or Apple Wallet app.

Nevertheless, the collaboration of Apple Pay in Vietnam still has many limitations as Apple only incorporate with only 13 popular Vietnamese commercial banks, including Vietcombank, Sacombank, Techcombank, MB Bank, VPBank,

ACB, HD Bank, BIDV, Eximbank, VIB, MSB, TPB, and OCB (Apple, 2025). With the appearance of Apple, the race for cashless payments in Vietnam becomes more intense.

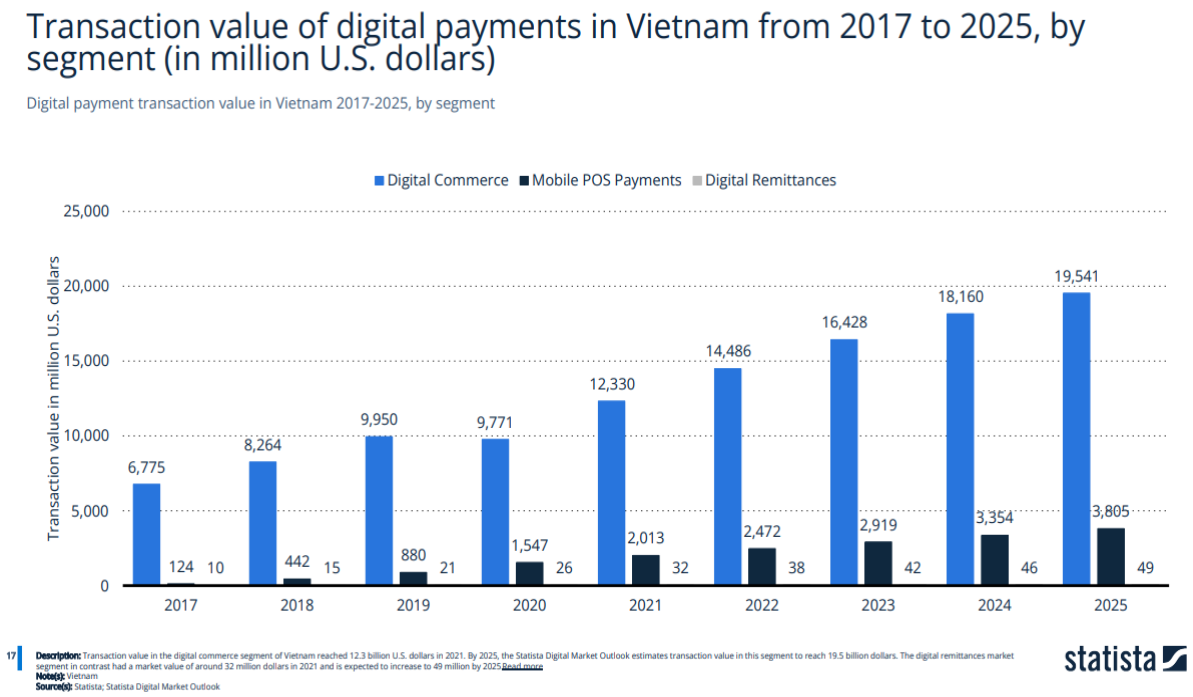


Chart 4: Transaction value of digital payments in Vietnam between 2017 and 2025

The transaction value in digital commerce segment of Vietnam was predicted to reach over 19,5 billion U.S. dollars by 2025. Moreover, the transaction value in Mobile POS payments experienced an upward trend, and this figure was expected to hit over 3,8 billion U.S. dollars by 2025. (Statista, 2021)

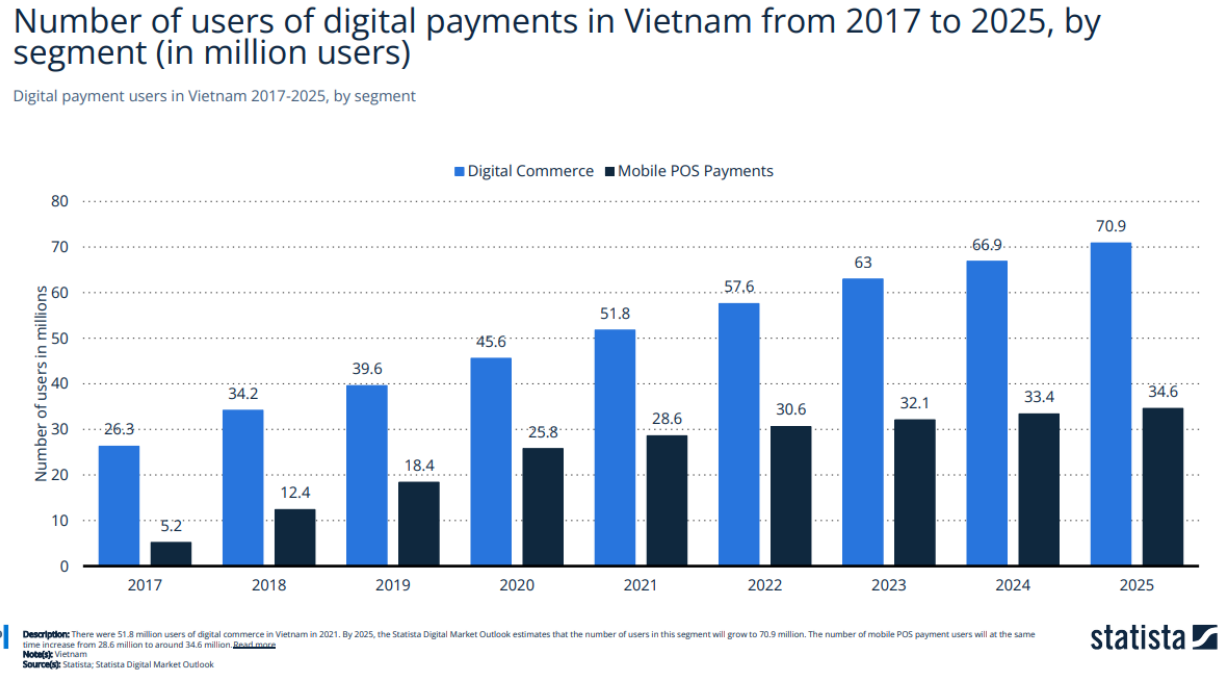


Chart 5: Number of users of digital payments in Vietnam from 2017 to 2025

The number of users of digital payment in digital commerce segment forecasted to reach almost 71 million people by 2025. Additionally, the figure for mobile POS payments segment was expected to hit over 34 million users by 2025.

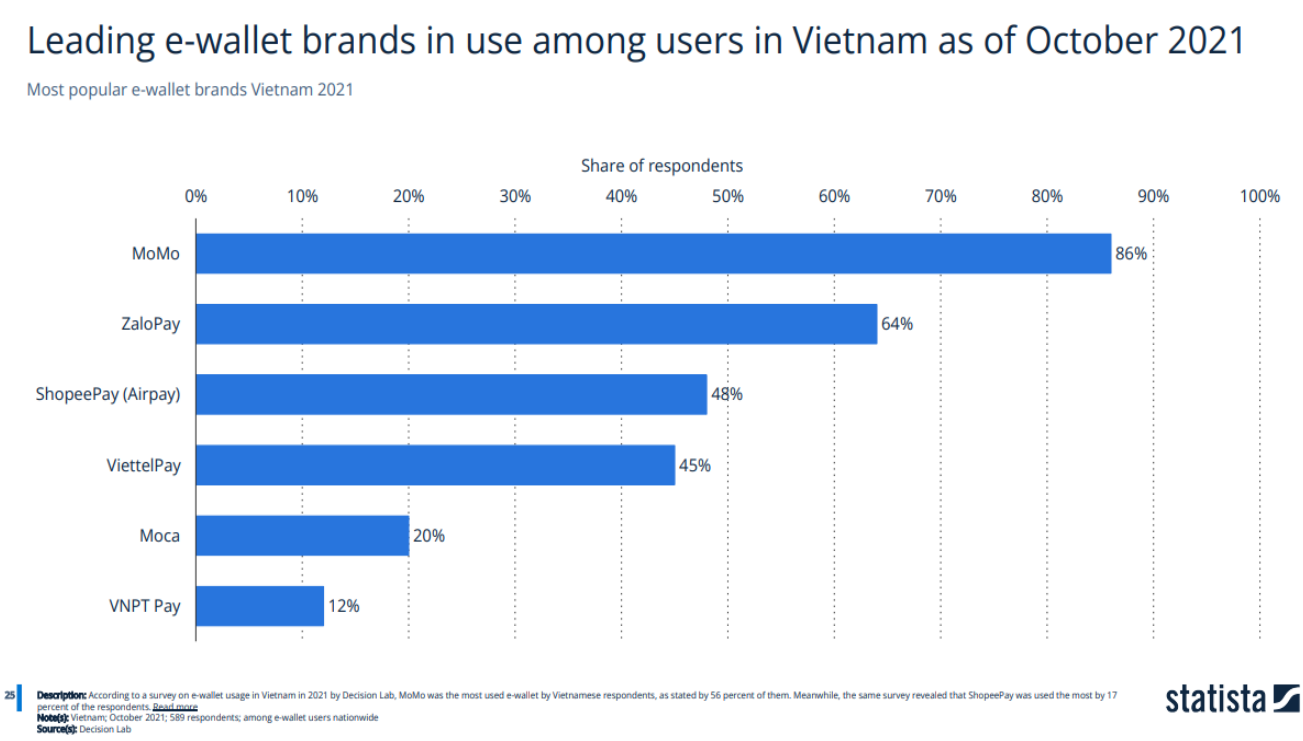


Chart 6: Leading e-wallet brands in use among users in Vietnam in 2021

Regarding a survey on e-wallet usage in Vietnam 2021 by Decision Lab, MoMo was the most used e-wallet by Vietnamese consumers, as counted by 86 percent of respondents following by Shoppe Pay accounted for 64% share of respondents.

Table 1: The number of smartphone users and iOS users in Vietnam (2023)

Country	Total Population	Smartphone penetration	Smartphone users	Estimated Market share of iOS in Vietnam	Estimated iPhone users
Vietnam	97,340,000	63.10%	61,421,540	34%	20,883,324

Source: author's own compilation from reports

As reported by HSBC, the number of smartphone users in Vietnam expected to hit over 67 million by 2025, meaning that the number of iPhone users could increase by 30 million. As a result, Apple Pay still has a great number of room to grow its market share even though it has been in the market for less than a year.

Currently, several prominent Vietnamese commercial banks are actively implementing cashless payment programs, and cooperation with Apple Pay is very important in the strategy of developing new customers and increasing CASA ratio (Current Account and Savings Account).

In Vietnam, Apply Pay does not charge any fee for parties when making a transaction with Apple Pay, including users, issued card banks, retail stores, restaurants, and service providers. In addition, iOS users who have data of bank cards added to apple wallet do not need to connect Internet to make transactions because our information saved on iOS devices. This is an advantage over QR payments which require an Internet connect for authentication. (Vnexpress, 2023)

– Overview of some studies on Apple Pay in Vietnam

No.	Author	Country	Variables	Method	Findings
1	Nguyen Minh Sang (2024)	Vietnam	Mobile user skillfulness, personal innovation, convenience , perceived risk and social image were added to TAM model	Quantitative	Perceived risk and social image do not significantly affect to Vietnamese customers intention (Generation Z)

3.3. Apple Pay usage in Vietnam: Potentials and challenges

3.3.1. Development potentials

The global cashless payments market has significant experienced high-pace of growth, this total value of all mobile POS transactions was predicted to reach 5.4 billion by 2024 (Statista,2023). According to economists from World bank, developing new cashless technologies plays an important role in utilizing energy more efficient than the old ones, resulting in climate-benefits in the future (World bank, 2023).

Furthermore, Vietnam Government is likely to strive for developing cashless payments in daily life to provide utilities to citizens and businesses. The authorities plan to follow a vision to 2030 (Scheme 06) to finish digital transformation for Vietnam. The role of state bank of Vietnam is highly crucial to implement the Prime Minister on the National Strategy on Cashless Payment Promotion between 2021 and 2025 (Decision No. 1813/QD-TTg dated October 28, 2021).

In terms of Apple technology development, Apple launched a new operating system called iOS 18 in July, 2024. Particularly, Apple Pay users will have a chance to experience a new function in making transactions and accumulating rewards with Tap to Cash which supports peer-to-peer payments quick and easy without sharing phone numbers or email addresses. Apple also provide several forms of authentications as Face ID, Touch ID, or passcode. (Apple, 2024)



Fig1. Touch to pay iOS 18 (Source: Apple)

Apple Pay is expected to increase significantly in the near future, because the number of smartphone users in Vietnam predicted to reach over 67 million by 2025 (HSBC). This means that the number of iPhone users are likely to grow as the iPhone market share in Vietnam is over 34% (Statista, 2023). As a result, Apple Pay still has a great number of room to grow its market share even though it has been in the market for less than a year.

Currently, several prominent Vietnamese commercial bank are actively implementing cashless payment programs, and cooperation with Apple Pay is very important in the strategy of developing new customers and increasing CASA ratio (Current Account and Savings Account). CASA ratio is one of the most crucial funds for commercial banks in Vietnam to provide capitals and credits for consumers and businesses with an affordable price and maintain Vietnam economy stability.

Although Apple's update to the new version of iOS 18 (2024) will bring users the best experience, it also causes challenges for commercial banks in Vietnam, especially in the development of P.O.S payments.

Table 2: Sales and Costs related to P.O.S transactions in Vietnamese commercial banks 2023

Total number of commercial banks affiliated with Apple Pay (2023)	Total market share of Apple Pay affliated banks (payment accounts)	Total value of P.O.S payments (*) (Dong)	Average cost of a P.O.S device (Dong) (**)	Average cost per transaction P.O.S (***)	Total revenue from P.O.S related activities (****) (Dong)	Total number of P.O.S devices and equivalents (Unit)
6	66%	314,302,000,000,000	200,000	1.6%	5,136,332,400,000	537,502

Source: author's own compilation from commercial banks and State Bank of Vietnam reports 2023

(*): According to the report of the State Bank of Vietnam payment department in the fourth quarter of 2023

(**): Based on the average P.O.S machine rental fee at VPBank in 2023

(***): Based on the average fee of the card accepting unit (Visa, Mastercard, JCB…)

(****): Total revenue from P.O.S related activities = total value of P.O.S payments * average cost per transaction P.O.S + average of P.O.S machine rental fee * total number of P.O.S devices and equivalents

Even though, Apple Pay only collaborated with 6 commercial banks in Vietnam, total number of commercial banks affiliated with Apple Pay accounted for over 66% of market share relating to payment accounts in Vietnam. Therefore, Apple Pay can have a lot of opportunities to grow with a huge customer base.

However, based on data that author complicated from the report of the State Bank of Vietnam and commercial banks in 2023, commercial banks need to have practical strategies in order to face challenges related to loss of revenue from P.O.S activities (over 5.000 billion dong). Total value of P.O.S payments is significant high, but the average cost per transaction P.O.S is still a big problem for commercial banks and businesses. This will lead to financial cost pressure for businesses using P.O.S machines for payment. This cost will also be a barrier to creating challenges in developing POS network coverage and encouraging card payments. If bank managers fail to devise effective strategic solutions to tackle this issue promptly, the consequences could be significant, it is likely that businesses related to P.O.S payment will tend to switch to using Apple Pay instead in the near future because of the high market share of Apple users in Vietnam and benefits regarding transaction costs. Moreover, Apple's convenient and fast tap-to-pay technology for iOS users (sellers and buyers) will attract and push users to switch to using Apple Pay for payments.

3.3.2. Challenges in developing Apple Pay in Vietnam

Although Apple is one of the biggest technology companies in the world, Apple Pay only appears less than a year in Vietnam. As a result, developing Apple Pay usage still has many difficulties and challenges:

First, difficulties are related to direct competitor in Vietnam. As we discussed above, MoMo and Zalo Pay are the two largest and most popular e-wallet providers in Vietnam, so Apple Pay need to have several effective strategies in marketing to improve Vietnamese customer intention. (Statista)

Second, risk factors related to cybercrime will make users in Vietnam somewhat concerned when using new payment methods as Apple Pay. In addition, the security system on the smartphone still has may loopholes, because user still lack knowledge related to technology and finance. Therefore, this will have a significant impact on the psychology of users when they first start using a new method. (Kim, Ferrin, & Rao, 2008)

Third, the collaboration between Apple Pay and commercial banks in Vietnam has not been widely implemented (13 commercial banks), and many customers at other banks have not had the opportunity to experience these new features. This leads to the opportunity to expand Apple Pay’s market share in Vietnam being small.

4. SOME RECOMMENDATIONS

Apple Pay have great potential to expand and develop its business at Vietnam’s mobile payment market. However, to optimize the advantages and potentials of Apple Pay usage, commercial banks and marketers from Apple need scientific research that provide reliable evidence for future policies and strategies. The article provides some recommendations as follows:

First, Vietnamese commercial banks and Apple need to conduct more and more marketing promotion campaigns to raise customer’s awareness and encourage them to use Apple Pay in their daily payment transactions.

Second, Apple Pay also follow and approach the Decision No. 1813/QD-TTg dated October 28, 2021 of the Prime Minister on the National Strategy on Cashless Payment Promotion with a vision to 2030 (Scheme 06).

Third, in terms of doing research relating to the adoption of Apple Pay in Vietnam, besides the popular model as technology acceptance model (TAM), Unified Theory of Acceptance and Use of Technology, Theory of Reasoned Action, and Theory of Planned Behavior, researchers could apply the framework of a risk/trust-based valence (Lee, Ferrin, and Rao, 2008). Applying risk/trust valance framework could open opportunities for future research related to Apple Pay in Vietnam.

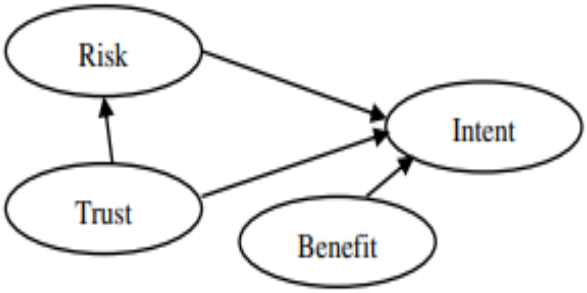


Fig2. Risk/Trust Valance Framework (Kim, Ferrin, & Rao, 2008

Fourth, based on data that author complicated from the report of the State Bank of Vietnam and commercial banks relating to P.O.S payments activities, the authorizes and commercial banks need to cooperate to find practical solutions for businesses to lessen their burden on daily operational costs relating to P.O.S payments. Moreover, commercial banks need to have practical strategies in order to face challenges related to loss of revenue from P.O.S activities

5. CONCLUSION

Although Apple Pay brings many opportunities for Vietnamese customers to experience cashless payments, it also has many challenges during implementation. To develop the usage of Apple Pay in Vietnam, the State, State Bank of Vietnam, commercial banks, Apple and relevant agencies need to coordinate more closely and widely with each other to ensure the interests of all parties as well as provide users with cashless payment methods and aim for common sustainable development goals.

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ANALYSIS OF RESEARCH TRENDS ON KOREAN SPEAKING EDUCATION UTILIZING MEDIA

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ABSTRACT

This study aims to examine and analyze research trends related to Korean speaking education utilizing media, categorizing the studies by year, type of media, topic, and research subject. By doing so, it seeks to identify how research on Korean speaking education using media has been conducted and to propose future directions for its development. For analysis, academic research data was collected through the Research Information Sharing Service (RISS, http://www.riss.kr). A keyword search using "media" and "Korean language" identified studies published between 2000 and February 2024. The findings indicate that between 2003 and 2021, only 3 to 4 papers were published annually, while in 2022, during the pandemic, 10 papers were published. From 2022 to 2024, the number of papers published annually has remained at around 5. These results suggest that research on Korean speaking education utilizing media remains insufficient. This study, therefore, analyzes these trends and presents conclusions regarding potential directions for the further development of Korean speaking education utilizing media.

Keywords: “Educational media”, “Korean speaking”, “Korean speaking education strategies”, “media”, r”esearch types”.

1. INTRODUCTION

This study aims to analyze research trends on Korean speaking education utilizing various media for foreign learners and to propose directions for future research development.

It is often said that we live in the "age of media." The rapid advancement of electronic and communication technologies has led to the emergence of new forms of media that are shaping the information era. Young people who have grown up in this media-centric environment are adept at using various media to express themselves, build relationships, and influence societal changes.

Kim Kyung-sook and Ra Hye-min (2011V59:474) argue that the new generation of learners differs from previous text-based generations and can be classified as a "visual generation" accustomed to new media. They efficiently perceive and structure new information through strong audiovisual stimuli and tend to actively align their learning motivations and goals with their personal interests and pREFERENCES.

Jang Hye-rim and Song Hyang-geun (2019) state that most foreign language learners prefer to obtain information through video content rather than text. As a result, various forms of visual media have been actively used in Korean language education, and research on this topic has continued to evolve.

Korean language education must keep pace with these societal changes by continuously researching and developing curricula that integrate media. The use of media in education enhances learner engagement, fosters active participation, and improves overall learning effectiveness. Consequently, numerous research studies have been published on the integration of media into reading, writing, listening, and speaking education.

However, research on Korean speaking education utilizing media remains relatively limited. This study specifically analyzes the trends in research on this topic and, based on the findings, proposes directions for future research and development.

2. REVIEW OF PREVIOUS STUDIES

A review of previous studies on research trends in Korean speaking education revealed that the study by Lee Dayeon and Kang Sosan (2022), titled "Analysis of Research Trends in Korean Speaking Education," proposed future directions for research in this field. Regarding research on Korean language education using media, studies such as Jang Hyerim and Song Hyanggeun (2019) on "Analysis of Trends in Visual Media," Park Jincheol (2019) on "Analysis of Trends in

Multimedia," and Yoo Haejun (2019) on "Trends in Research on Korean Speaking Education Using Media" were identified.

Among these, Yoo Haejun (2019) analyzed trends in research on Korean speaking education using media by categorizing studies by period, research topics, and research types. This study expands on previous analyses by incorporating an additional classification of research trends based on types of media used and target proficiency levels (beginner, intermediate, advanced). While Yoo Haejun (2019) focused on analyzing research trends, this study aims to analyze research trends specifically in the context of educational methodologies.

Here, it is important to define the term "media (매체)," which is central to this study. According to the Standard Korean Dictionary, "media" is defined as "a material or means that transmits an effect from one side to another." In modern times, the term commonly refers to various means of information transmission, including mass media and social networking services (SNS) facilitated by the internet. Representative media include television and radio broadcasts (news, dramas, advertisements), films, and platforms like YouTube, which are widely used by the general public. These forms of mass media, driven by the rapid development of the internet, have become a primary means of communication for younger generations. The "media generation" is more accustomed to visual communication than to text-based interaction, frequently using mobile phones and tablets for daily communication. The COVID-19 pandemic further solidified the role of online education, demonstrating the potential for internet-based learning in a globalized and rapidly evolving digital era. In response, Korean language education has increasingly incorporated media-based instructional methods, leading to numerous studies in this area.

Given this context, this study seeks to examine how media-based education in Korean language teaching has evolved since the early 2000s. By analyzing past research, this study aims to provide insights into future research directions for Korean speaking education using media.

3. RESEARCH METHODOLOGY

3.1. Subjects and Methods of Analysis

For analysis, data was collected from the Research Information Sharing Service (RISS, http://www.riss.kr) using the keywords "media" and "Korean" for studies published from 2000 to February 2024. This search yielded 328 studies. A refined search using "media," "Korean (한국어)," and "speaking (말하기)" resulted in 72 studies. Additional searches incorporating keywords such as "film (영화)," "multimedia (멀티미디어)," "drama (드라마)," "web drama (웹드라마)," "YouTube (유튜브)," and "music video (뮤직비디오)" yielded 68 studies related to Korean speaking education using media.

Out of these, 68 studies were identified as directly relevant to this study's focus on "Analysis of Research Trends in Korean Speaking Education Using Media." This includes 61 master's theses and seven journal articles. These studies were analyzed based on the following classifications: by year, by type of media, by research topic, and by target learners. The scope of this study is limited to research specifically on methodologies for Korean speaking education using media. Studies that address integrated education (e.g., listening and speaking combined) or general Korean education methodologies were reviewed and categorized accordingly.

3.2. Criteria for Analysis

The study categorizes the 68 selected research papers based on the following criteria:

– **Analysis by Time Series (Year over Year):** Papers published between 2010 and 2024 are examined on an annual basis to observe research trends over time.

– **Analysis by Type of Media:** Research is classified according to the types of media used (e.g., films, web dramas, YouTube, multimedia, etc.).

– **Analysis by Topic:** Studies are grouped based on their research objectives and content to differentiate between various research focuses.

– **Analysis by Research Subject (Target Learner Group):** Research is analyzed based on the target learners (e.g., beginner, intermediate, or advanced learners) to understand how different proficiency levels have been addressed in

previous studies.

Through this classification, the study aims to provide a comprehensive overview of how research on Korean speaking education using media has evolved and to propose directions for future research in this field.

4. ANALYSIS OF RESEARCH TRENDS

4.1. Analysis by Time Series (Year over Year)

The status of research on the trends in Korean speaking education using media by year is shown in [Table 1].

Table 1.Status of Research Papers by Time Series

Year	Doctoral Dissertations	Master's Theses	Academic Papers	Total
2003		1		1
2010		2		2
2011		4	1	5
2012		2		2
2013		4		4
2014		5		5
2015		3		3
2016		1		1
2017		5		5
2018		3		3
2019		3	4	7
2020		5	1	6
2021		5		5
2022		10		10
2023		4	1	5
2024		4		4
Total		61	7	68

In 2003, one paper was published, but no papers were published from 2004 to 2009. Since the publication of two papers in 2010, there have been steady publications each year, although not in large numbers. A notable feature is the absence of doctoral dissertations. The small number of papers, particularly the lack of doctoral dissertations, indicates that the educational value and recognition of media-assisted education in Korean language education are still not high. According to Yoo Hae-jun (2019, p.171), this is because language education utilizing media has not been regarded as an academic achievement but merely as a means of instruction. Furthermore, in the field of Korean language education, unlike Korean language education for native speakers or foreign language education, the area of 'language media' or 'media-assisted language education' has been perceived as an auxiliary and instrumental aspect of instruction.

In particular, the highest number of papers (10) was published in 2022. This was likely due to the peak of the COVID-19 pandemic, which necessitated online (비대면 교육) learning at home. However, there was a decline in the number of papers published in 2023, coinciding with the end of the pandemic. This decrease can be attributed to the resumption of in-person classes (대면 수업) at schools.

4.2. Analysis by Type of Media

The research trends on Korean speaking education using different media types are shown in Table 2.

Table 2. Status of Research Papers by Media Type

Media Type	Number of Papers
Drama	34
Web drama	2
Animation	7
Film	5
Music Video	3
Metaverse	3
Multimedia	2
Webtoon	2
Entertainment Programs	1
Virtual Reality (VR)	1
Pop Songs	1
TV News	1
Videos	1
Radio Broadcasts	1
Photos	1
Others	3
Total	**68**

An analysis of the research content reveals that the most commonly used medium in studies was drama, with 34 papers, followed by animation (7), film (5), web drama (2), and music videos (3). These visual media accounted for 75% of the studies. Additionally, studies using the metaverse (virtual reality) totaled 3 papers, while multiple media and webtoons were each utilized in 2 studies. Other categories had only one study each, with three categorized as miscellaneous.

The predominance of research on Korean speaking education using dramas is likely related to learners' characteristics. The MZ generation, for instance, shows a strong affinity for media and is adept at utilizing various types of media content. Foreign learners, in particular, often develop an interest in Korean culture and language through exposure to Korean dramas. Kim Min-kyung (2019) noted that TV dramas are widely accessible, provide insights into Korean emotions and culture, and enhance learners' curiosity and motivation, thereby improving learning outcomes. Sun Xiaolin (2022) further argued that Hallyu (Korean Wave) content is not merely entertainment but has become valuable educational material. The diversification of Hallyu content necessitates its further development as Korean language learning resources.

Many studies have emphasized the necessity of media-assisted Korean language education. Given these insights, it is essential to conduct further in-depth research on Korean language education methodologies that incorporate media.

4.3. Analysis by Topic

The research trends on Korean speaking education by topic are shown in Table 3.

+Table 3. Status of Research Papers by Topic

Research Topic	Number of Papers
Research on Korean Speaking Education Methods Using Media	39
Research on Integrated Korean Education Methods Using Media (Listening & Speaking)	13
Research on Integrated Korean Education Methods Using Media (Reading & Speaking)	1

Research on Integrated Korean Education Methods Using Media (Listening, Speaking, Reading, Writing)	11
Research on Cultural Integration Education Using Media	3
Research on Korean Pragmatics Classes Using Web Dramas	1
Total	**68**

An analysis of research papers by topic shows that the majority (39 papers, approximately 60%) focused on media-assisted Korean speaking education. Studies on integrated listening and speaking education accounted for 13 papers (21%), while research on the integration of listening, speaking, reading, and writing comprised 11 papers (18%). Other topics included media-assisted cultural integration education (3 papers), media-assisted reading and speaking education (1 paper), and research on pragmatic education using web dramas (1 paper). Overall, studies on speaking education accounted for over 94% of the total research.

The predominance of studies on speaking education aligns with the primary objective of foreign learners, which is effective communication in Korean. Jae-young Kim (2003) emphasized that the primary goal of Korean language education is to develop communicative competence. While learners have diverse objectives, the enhancement of communicative competence remains a fundamental premise for all learning goals. Consequently, research on improving communicative abilities is expected to remain a major focus in Korean language education.

4.4. Analysis by Research Subject (Target Learner Group)

The research trends on Korean speaking education based on the target learners are shown in Table 4.

Table 4. Status of Research Papers by Target Learner Group

Target Learner Group	Number of Papers
Beginner	15
Beginner & Intermediate	2
Intermediate	34
Beginner, Intermediate & Advanced	2
Intermediate & Advanced	2
Advanced	4
Children	2
Others	7
Total	**68**

An analysis of research papers on media-assisted Korean speaking education by target learner group shows that 55 papers (approximately 81%) focused on learners from beginner to intermediate levels, while only 4 papers addressed advanced learners, indicating a decreasing trend in research at higher proficiency levels. This trend reflects the necessity of helping beginner-level learners engage with Korean through accessible and familiar media, increasing their interest and encouraging active participation in learning. Furthermore, at the intermediate level, research has been particularly active in utilizing various audiovisual media to deepen learners' understanding of native speakers' culture문화), pronunciation(발음), and intonation(억양). This approach aims to enhance learners' ability to communicate more fluently in real-life situations.

5. CONCLUSION

This study aimed to analyze research trends in Korean speaking education for foreign learners using various media and to propose directions for future research on media-assisted Korean speaking education.

To examine research trends from 2000 to February 2024, a total of 328 papers were reviewed. Since the focus of this study was on media-assisted Korean speaking education, the analysis was limited to relevant research papers on this topic. As a result, 68 papers were selected, including 61 master's theses and 7 journal articles.

An analysis of the annual publication volume revealed that from 2000 to 2021, between 1 to 5 papers were published each year. Notably, 5 papers were published in both 2020 and 2021, while the number increased to 10 in 2022. This surge coincides with the COVID-19 pandemic, which began in 2019. During this period, social distancing measures, restrictions on movement, and the transition to remote learning led to a disruption of traditional education. As online learning via the internet became widespread, interest in internet-based media increased, likely contributing to the rise in research publications. However, with the end of the pandemic and the return to in-person classes, interest in media-assisted Korean speaking education appears to have declined, leading to a decrease in publication volume.

The analysis by media type showed that drama, animation, music videos, and film accounted for 75% of the total research. This trend reflects the fact that today's learners belong to the digital media generation, prompting researchers to explore the use of audiovisual media in Korean speaking education.

The topic-based analysis revealed that studies on media-assisted Korean speaking education were the most prevalent, accounting for 39 papers (approximately 57% of the total). Studies on integrated listening and speaking education accounted for 13 papers (19%), while those on the integration of listening, speaking, reading, and writing totaled 11 papers (16%). Additionally, research on integrated reading and speaking education consisted of 1 paper. Overall, speaking-related studies accounted for over 93% of the total research, highlighting the significance of speaking and communicative competence (의사소통 능력) in Korean language education.

The analysis by research subject showed that 55 papers (81% of the total) focused on beginner to intermediate learners, while research on advanced learners was significantly lower. This finding suggests that research has been particularly active at the beginner level, where accessible and familiar media help learners develop interest and engage actively in language learning. At the intermediate level, learners can further develop their speaking skills by using various audiovisual media to gain a deeper understanding of native speakers' culture, pronunciation, and intonation. This approach facilitates smoother communication, which explains the concentration of research at this level.

Based on these findings, it is evident that research on media-assisted Korean speaking education remains insufficient. Further studies are needed to explore effective methods for utilizing media in Korean language education, particularly in addressing the needs of learners at different proficiency levels.

Modern learners prefer to engage with text through various media rather than reading books. They tend to understand and acquire knowledge more effectively through videos rather than written text. However, in many educational settings, instruction is still delivered through textbooks using traditional lecture-based methods. While some areas of education have adapted to the fast-changing digital era, many educational institutions, particularly universities, lag behind in adopting media-based learning approaches. There are several reasons for this, including educators' awareness, the constraints of fixed curricula and class hours, and the challenge of producing appropriate video materials to match textbook content. Additionally, teachers often lack expertise in media usage, and even those who are knowledgeable may find it difficult to invest the necessary time, effort, and resources.

However, after the pandemic, many educational institutions installed internet and media facilities, providing an environment conducive to media-based instruction. To effectively integrate media into classroom instruction, teachers must have knowledge of video media and be willing to invest considerable time and effort. Despite these challenges, numerous simple video editing software programs are now available for free online, making it easier for educators to incorporate video content into their lessons.

By utilizing such tools in Korean speaking education, lessons that were once perceived as boring and difficult can become more engaging and intuitive through visual content. This approach can enhance not only speaking skills but also listening comprehension. Additionally, learners can indirectly experience Korean culture through the settings, behaviors, and language used in videos. As a result, incorporating media into instruction can significantly improve student engagement and maximize learning outcomes.

Furthermore, the analysis revealed that there are no doctoral dissertations on Korean speaking education using media. Yoo Hae-jun (2019) suggested that this is because the field of media-assisted language education has not been recognized as an academic discipline but rather as a supplementary teaching tool. In the field of Korean language education, unlike in Korean language studies or foreign language education, media-based language education is still regarded as an auxiliary

instructional method rather than a distinct academic field.

In the future, recognizing that various forms of media can play a leading role in education and actively incorporating them into Korean language education—particularly in listening and speaking instruction—will enhance accessibility and educational effectiveness for foreign learners.

Notably, integrating platforms like TikTok, which has gained immense popularity among younger generations worldwide, into Korean language education could yield highly positive results. By leveraging TikTok, young learners and those interested in studying Korean can develop greater enthusiasm and immersion in their studies, thereby improving learning outcomes.

For instance, short videos covering basic Korean consonants and vowels, fundamental pronunciation, and simple conversations could be created and distributed for use in lessons. This approach would shift the perception of learning Korean from a formal academic activity to an enjoyable experience. By actively embracing contemporary social and technological trends, integrating media into Korean language education will contribute significantly to its advancement.

This study analyzed research on Korean speaking education using media by categorizing it based on publication year, media type, research topic, and target learners. It also aimed to suggest future directions for the development of media-based Korean speaking education.

Moving forward, it is hoped that more studies will be conducted across all areas of Korean language education utilizing media to contribute to its continued growth and improvement.

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CHALLENGES AND OPPORTUNITIES FOR HO CHI MINH CITY TO DEVELOP A SUSTAINABLE AND RESILIENT LOGISTICS INDUSTRY IN THE DIGITAL ERA: A VISION FOR 2050

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ABSTRACT

This study investigates the development of a sustainable and resilient logistics industry in Ho Chi Minh City (HCMC) amidst challenges posed by rapid urbanization, climate change, and digital disruption. It identifies key infrastructural deficits, environmental concerns, and policy shortcomings while highlighting transformative opportunities through digital technologies, green logistics, and innovative public-private partnerships. Drawing lessons from global logistics hubs, the research envisions actionable strategies for HCMC to overcome systemic inefficiencies and environmental vulnerabilities. Furthermore, by adopting a forward-looking vision for 2050, the paper outlines a roadmap to establish HCMC as a globally competitive, sustainable logistics hub, aligning with international standards and advancing economic, environmental, and social resilience.

Key words: "Sustainable logistics", "digital transformation", "resilience", "green initiatives", "public-private partnerships".

1. INTRODUCTION

Ho Chi Minh City (HCMC) occupies a central position in Vietnam's economy, contributing over 22% of the national GDP and accounting for more than 70% of the country's containerized trade, according to (Vietnam_Logistics_Report, 2022). As the largest urban area in Vietnam, HCMC serves as the nucleus of the national logistics network, benefiting from its geographical proximity to major maritime routes and integration into the ASEAN region. However, despite its strategic importance, HCMC's logistics sector is encumbered by multifaceted challenges that threaten its sustainability and resilience in the face of global economic shifts and environmental imperatives.

One of the most pressing issues confronting the city is its pervasive congestion, which ranks among the worst in the region. Logistics-related transport activities alone are responsible for approximately 45% of the city's greenhouse gas (GHG) emissions (Ministry_of_Natural_Resources_and_Environment, 2023). The emissions exacerbate environmental degradation and pose significant risks to public health. Compounding these challenges, the COVID-19 pandemic revealed vulnerabilities in supply chain operations, as logistics costs surged by over 200% between 2020 and 2022, adversely affecting businesses and highlighting the fragility of existing systems (UNCTAD, 2022). The increasing complexity of global trade dynamics and the accelerated growth of e-commerce have further intensified the demand for efficient logistics solutions, underscoring the need for transformative change.

Infrastructure inadequacies represent another critical obstacle. HCMC's road networks are outdated and unable to accommodate the burgeoning volume of trade, while underdeveloped rail systems and insufficient multimodal connectivity create bottlenecks that delay shipments and escalate costs. Additionally, the reliance on diesel-based transport systems not only increases operational inefficiencies but also contributes significantly to air pollution and climate change. The adoption of advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), and blockchain has been slow, particularly among small and medium enterprises (SMEs). High implementation costs, coupled with inadequate digital infrastructure, have stifled innovation and limited the sector's ability to enhance operational efficiency and competitiveness.

Policy and planning frameworks present further challenges to the sector's growth. Fragmented regulatory structures and uncoordinated urban planning have failed to provide clear guidance or meaningful incentives for sustainable practices. This lack of coherence has resulted in missed opportunities to align the logistics industry with broader goals of environmental sustainability and economic resilience. Consequently, HCMC's ability to compete in regional and global

markets is under threat, while its social and environmental well-being is increasingly at risk.

In addressing these complex challenges, this research adopts a long-term vision for 2050, emphasizing the need for a strategic and forward-looking framework. The choice of a 2050 horizon is informed by the scope and depth of systemic transformations required to overcome entrenched barriers. A long-term perspective allows for the incorporation of emerging global trends, including the integration of digital technologies, the advancement of green logistics practices, and the alignment with international sustainable development goals. By adopting a 2050 vision, the research underscores the necessity of gradual and sustained change, which is vital for addressing the structural deficiencies and evolving demands of HCMC's logistics sector. In general, this study contributes to the discourse on sustainable and resilient logistics in several meaningful ways. Firstly, it provides a comprehensive analysis of the infrastructural, environmental, technological, and regulatory challenges confronting HCMC's logistics industry. This diagnostic approach lays the groundwork for targeted interventions aimed at mitigating systemic inefficiencies. Secondly, the research explores the potential of digital transformation and green logistics initiatives as pathways to sustainability and competitiveness. By leveraging advanced technologies and environmentally friendly practices, the study highlights opportunities for HCMC to align its logistics operations with global best practices. Last but not least, the research offers a strategic roadmap for the development of a sustainable and resilient logistics ecosystem. This roadmap is designed to align with international sustainable development goals, proposing actionable strategies that integrate environmental, economic, and social considerations. By envisioning a logistics sector that is both efficient and sustainable, the study aims to position HCMC as a regional leader in logistics innovation by 2050. In addition, by adopting a forward-looking approach and emphasizing the integration of sustainability and digitalization, the study provides a blueprint for the evolution of HCMC's logistics industry. This vision for 2050 not only seeks to enhance the city's competitiveness in regional and global markets but also ensures its alignment with broader goals of environmental stewardship and economic resilience, solidifying its role as Vietnam's logistics nucleus for decades to come.

2. LITERATURE REVIEW

Urban logistics sustainability has been a critical focus for researchers aiming to address the challenges of urbanization, climate change, and technological advancements. The integration of technology and green initiatives has been consistently highlighted as pivotal in transforming traditional logistics systems into efficient, sustainable networks. Based on research results by (Lindholm, 2012), he underscores the vital role of local authorities in enabling sustainable freight systems through coordinated urban planning. The study highlights that fragmented planning leads to inefficiencies, increased emissions, and logistical bottlenecks. Effective collaboration between municipal bodies and logistics providers is essential to implement sustainable practices, such as low-emission zones and multimodal hubs.

Advancements in digital technology are transforming logistics operations. From (Kamble, Gunasekaran, & Sharma, 2020), they explore the application of blockchain technology in logistics, demonstrating its ability to enhance transparency, minimize fraud, and improve supply chain efficiency. Blockchain's decentralized nature also fosters trust among stakeholders, which is critical in cross-border trade. Similarly, according to (Ivankova, Mochalina, & Goncharova, 2020), they emphasize the transformative potential of the Internet of Things (IoT) in logistics, particularly in real-time monitoring and predictive maintenance. IoT-enabled sensors allow logistics operators to optimize asset utilization and proactively address maintenance needs, reducing downtime and costs.

Green logistics practices, such as electrification of transport fleets and renewable energy integration, are increasingly being adopted in leading cities. For example, Singapore has implemented smart logistics hubs powered by renewable energy, while Rotterdam has focused on green corridors to reduce emissions in freight transport (Tuas_Mega_Port, 2023). These initiatives provide a model for Ho Chi Minh City (HCMC), which faces similar environmental challenges. While cities like Singapore and Rotterdam have established benchmarks in smart and sustainable logistics, HCMC lags due to outdated infrastructure, limited multimodal transport systems, and policy fragmentation. As observed by the Vietnam Logistics Report in 2022, HCMC's reliance on road transport and the lack of regulatory incentives for green technologies hinder its progress toward sustainable logistics. Furthermore, emerging research emphasizes the importance of integrating circular economy principles into logistics. Reverse logistics systems, which focus on recycling and refurbishing used materials, play a vital role in reducing waste and promoting sustainability. Coca-Cola Vietnam's pilot initiatives on bottle

collection and reuse demonstrate the potential for circular supply chains (World_Bank_Group, 2023).

From the above literature survey, this study adopted a qualitative case-study approach to provide an in-depth understanding of the topic. The methodology comprised three primary components, including: i) *Secondary Data Analysis* - A detailed review of government and industry reports was conducted to gather foundational insights and contextual data; ii) *Comparative Analysis* - Key logistics hubs, including Singapore and Rotterdam, were examined to identify best practices, operational benchmarks, and innovative approaches; and iii) *Scenario Planning for 2050* - Forward-looking scenarios were developed and analyzed to anticipate potential challenges and opportunities in the logistics sector over the coming decades.

3. CHALLENGES IN DEVELOPING A SUSTAINABLE AND RESILIENT LOGISTICS INDUSTRY AT HO CHI MINH CITY

3.1 Infrastructure limitation

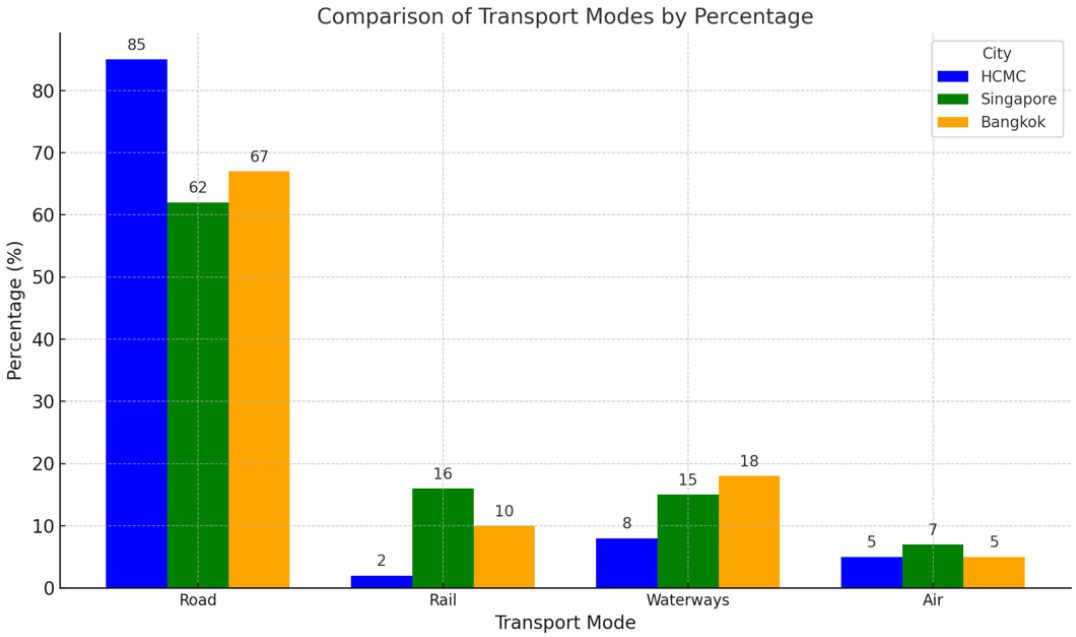


Figure 1: The comparison of transport modes.

Ho Chi Minh City's logistics infrastructure is under significant strain due to rapid economic growth and urbanization. Several critical factors exacerbate these challenges, as shown in the following.

– **Severe congestion:** Cat Lai Port, responsible for handling approximately 70% of Vietnam's containerized trade, experiences severe congestion that delays shipments and increases emissions (N.-T. Nguyen & Tran, 2019). Peak-hour traffic jams near the port extend delivery times, raise fuel consumption, and elevate costs for logistics operators (Saigon_Times, 2023). This congestion highlights the need for expanding port facilities and improving access roads.

– **Limited Rail Freight Usage:** As we can see from **Figure 1**, the comparison of transport modes demonstrates HCMC's over-reliance on road transport, while rail freight accounts for only 2% of HCMC's cargo transport compared to 16% in Singapore and 10% in Bangkok (Vietnam_Logistics_Report, 2022). This low utilization reflects the underdevelopment of the rail network, which could otherwise provide a more sustainable and cost-effective alternative to road transport. This means the untapped potential of rail and waterway systems, which could reduce costs and emissions while alleviating road congestion.

3.2 Environmental Challenges

Ho Chi Minh City (HCMC) faces significant environmental challenges in its logistics sector, primarily related to greenhouse gas (GHG) emissions, waste generation, and vulnerability to climate change. These issues are closely tied to the city's reliance on diesel-based freight transport, underdeveloped infrastructure, and inadequate mitigation measures for flooding. Addressing these challenges is critical for achieving a sustainable and resilient logistics system.

3.2.1 Greenhouse Gas Emissions by Transport Type

The logistics sector is a major contributor to HCMC's environmental degradation. Diesel trucks, which dominate freight transport, account for 45% of the city's GHG emissions, significantly worsening air quality and contributing to climate change (Ministry_of_Natural_Resources_and_Environment, 2023), as seen in **Figure 2**. The heavy reliance on fossil fuels in road transport, which constitutes 85% of freight movement, is a critical issue compared to Singapore and Bangkok, which utilize rail and waterways more extensively to reduce emissions (Vietnam_Logistics_Report, 2022). This over-reliance on diesel trucks highlights the need for the electrification of transport fleets and investment in greener alternatives like rail and waterways.

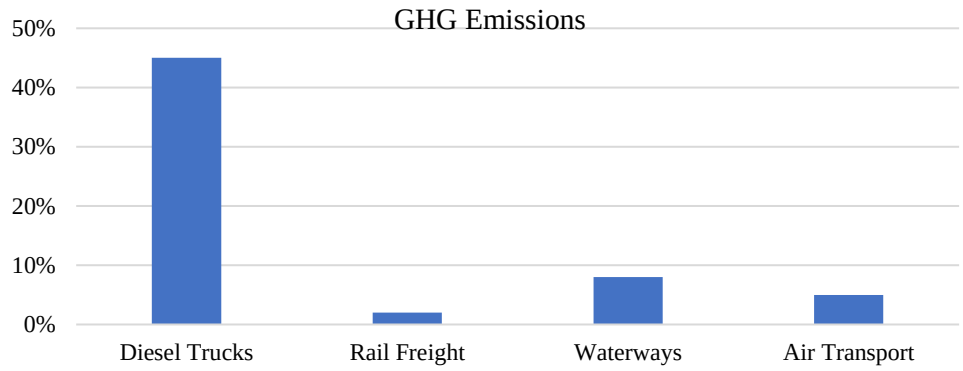


Figure 2: GHG Emissions.

3.2.2 Vulnerability to Flooding

HCMC's geographic position as a low-lying coastal city makes it highly susceptible to flooding. In 2022, monsoon-related floods severely impacted logistics operations in key areas such as District 2 and Thu Duc, leading to shipment delays, infrastructure damage, and economic losses exceeding $200 million (Saigon_Times, 2023), as indicated in Figure 3. Floodwaters disrupted warehousing, port access, and transport routes, highlighting the fragility of the city's logistics network to climate-induced disruptions. The frequency and severity of floods are expected to increase with climate change, necessitating the construction of flood-resistant infrastructure such as elevated warehouses, improved drainage systems, and climate-resilient roads.

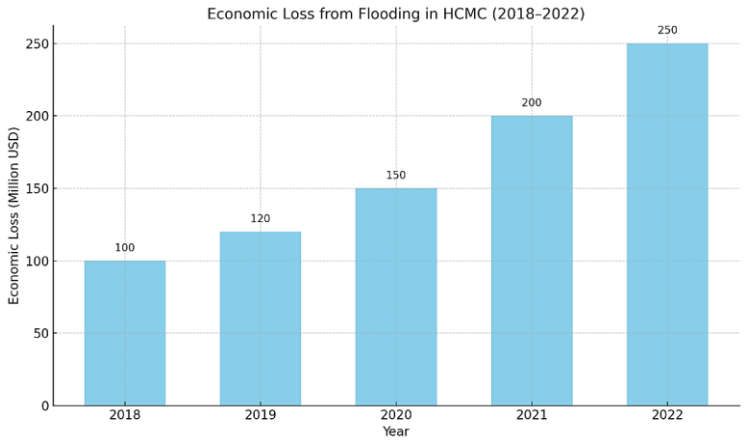


Figure 3: Economic Loss from Flooding in HCMC (2018–2022),

3.2.3 Waste Management Issues

Ho Chi Minh City's (HCMC) logistics sector faces significant waste management challenges exacerbated by the rapid growth of e-commerce, industrial activities, and inadequate recycling infrastructure. These issues contribute to environmental degradation and threaten the city's goal of achieving sustainable and resilient logistics operations. The rise of e-commerce in Vietnam, with an annual growth rate of over 25% between 2020 and 2023 (Statista, 2023), has led to a surge in packaging waste. Most logistics operations rely heavily on single-use materials such as plastic wraps, cardboard boxes, and Styrofoam, which are often non-recyclable or improperly disposed of.

Another problem is that Ho Chi Minh City's recycling infrastructure remains underdeveloped, which is another problem, with only a small fraction of logistics-related waste being recycled. Most packaging materials, such as plastics and cardboard, end up in landfills, contributing to resource wastage and environmental pollution. According to the database of Vietnam Logistics Report in 2022, less than 10% of logistics firms in HCMC have implemented reverse logistics systems to recover packaging materials for reuse (Vietnam_Logistics_Report, 2022). The informal recycling accounts for over 80% of waste recovery, leading to inefficiencies and health risks for waste pickers (Asian_Development_Bank, 2023b). High costs associated with implementing circular supply chains and the lack of government incentives for adopting reusable or biodegradable packaging further exacerbate these challenges. It is worth noting that the environmental consequences of inadequate waste management are significant. The improper disposal of plastics and non-biodegradable materials has resulted in severe land and water pollution. Plastics alone contribute to 50% of waste-related marine pollution in HCMC's waterways, creating long-term ecological damage (Ministry_of_Natural_Resources_and_Environment, 2023), as depicted in **Figure 4**. Additionally, landfill sites in HCMC are a major source of methane emissions, which are projected to increase by 30% by 2030 without effective waste management interventions. These environmental impacts highlight the urgent need for systemic changes to minimize waste and promote sustainable practices.

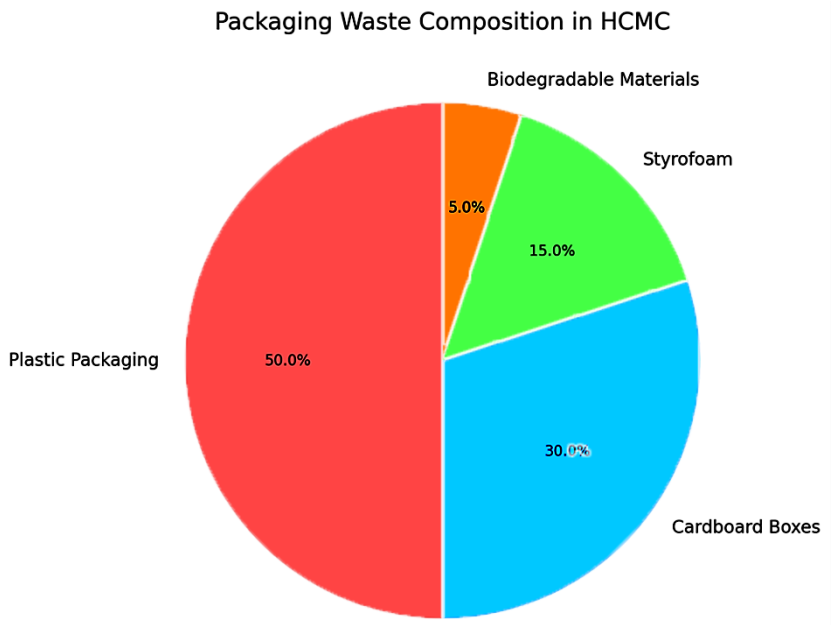


Figure 4: Packaging Waste Composition in HCMC.

3.3 Technological Barriers

The technological adoption in Ho Chi Minh City's (HCMC) logistics sector remains inadequate, primarily due to financial constraints, limited digital infrastructure, and a lack of skilled labor. Small and medium enterprises (SMEs), which constitute the majority of the logistics industry, face significant barriers in adopting advanced technologies such as the Internet of Things (IoT) and artificial intelligence (AI). High implementation costs and limited access to affordable financing options deter many SMEs from modernizing their operations. For instance, IoT-enabled devices, which can optimize real-time tracking and warehouse management, remain underutilized due to the prohibitive costs of installation and maintenance (Vietnam_Logistics_Report, 2022). Additionally, the lack of awareness about the benefits of IoT and AI among smaller firms further exacerbates this technological divide.

Blockchain adoption is another critical challenge. Although blockchain has the potential to enhance supply chain transparency, reduce fraud, and streamline administrative processes, only 18% of logistics firms in HCMC have integrated blockchain solutions (Vietnam_Digital_Transformation_Report, 2023), as shown in Figure 5. This adoption rate is significantly lower than in developed economies, where blockchain is widely used to manage cross-border trade and ensure data security. The reluctance to adopt blockchain in HCMC is attributed to a combination of high setup costs, limited technical expertise, and concerns about data privacy among local firms. Digital infrastructure in suburban and industrial zones also poses a barrier. Insufficient high-speed internet coverage and outdated IT systems limit the

deployment of real-time tracking systems and cloud-based logistics platforms, which are critical for modern supply chain management. Furthermore, a shortage of skilled labor in the logistics sector reduces the ability of firms to implement and operate these advanced systems. Many logistics workers lack training in handling technologies like AI (Artificial Intelligence)-powered analytics or blockchain-based transaction platforms, further slowing the pace of digital transformation in the sector.

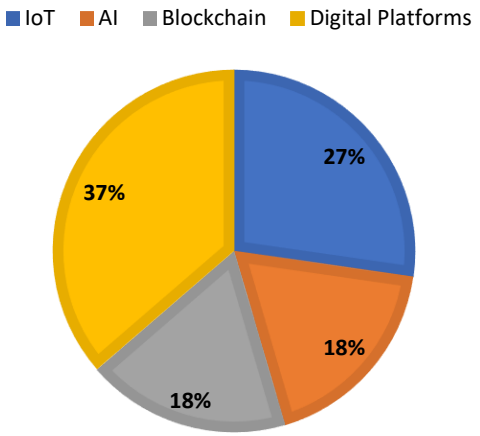


Figure 5: SME Technological Adoption in HCMC.

3.4 Policy and Regulatory Challenges

Policy and regulatory challenges present significant barriers to the development of a sustainable and resilient logistics sector in HCMC. Fragmented and inconsistent policies, combined with inadequate incentives for green technologies, have slowed progress and deterred investment in innovative practices. Administrative processes for obtaining permits for cross-border trade and infrastructure development are often lengthy and complex, involving multiple government agencies with little coordination. This creates administrative bottlenecks, increasing costs and discouraging investment in modernization. For instance, logistics firms report that obtaining permits for warehousing and transportation facilities can take several months due to regulatory redundancies (Vietnam_Logistics_Report, 2022). Furthermore, fragmented urban planning exacerbates inefficiencies, with uncoordinated development of industrial zones, residential areas, and transport networks leading to logistical challenges, such as increased delivery times and emissions. Despite their potential to significantly reduce GHG emissions and fuel costs, the adoption of electric vehicles (EVs) in HCMC's logistics sector remains low (Nguyen Thi Bich & Le Dinh, 2024), as shown in Figure 6. This is largely attributed to insufficient government support in the form of financial incentives, such as tax breaks, subsidies, or grants for EV adoption. In contrast, cities like Singapore and Amsterdam have implemented robust EV policies, including subsidies for EV purchases, tax exemptions, and the development of EV charging infrastructure, resulting in higher adoption rates (Tuas_Mega_Port, 2023) . The absence of similar policies in HCMC discourages logistics firms from transitioning their fleets to EVs, prolonging the reliance on diesel-powered vehicles and contributing to urban air pollution.

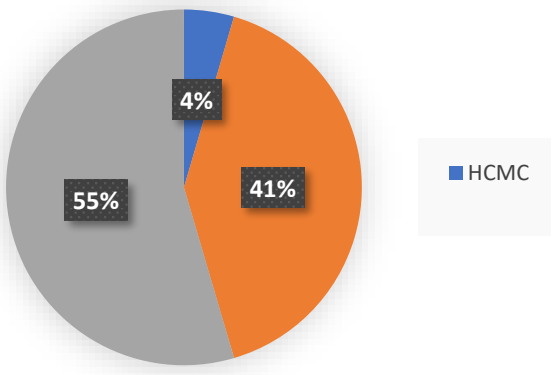


Figure 6: EV Adoption Rates Comparison.

3.5 Economic Pressures

Economic challenges significantly hinder the development of a sustainable and resilient logistics sector in HCMC. Rising operational costs, coupled with the lingering impacts of the COVID-19 pandemic, exacerbate existing vulnerabilities, discouraging the adoption of green technologies and infrastructure improvements. Logistics operators in HCMC face escalating costs driven by surging fuel prices and inflation. Diesel prices alone rose by over 30% in 2022, significantly increasing transportation costs for logistics firms reliant on road freight (Statista, 2023), as indicated in Figure 7. These rising costs leave operators with reduced margins, making it difficult to allocate resources for long-term investments in green technologies such as electric vehicles (EVs) or renewable energy-powered warehouses. Furthermore, inflationary pressures impact the entire supply chain, raising the costs of goods and services, which further discourages firms from pursuing sustainability initiatives.

Besides, the global COVID-19 pandemic exposed critical vulnerabilities in HCMC's logistics systems. The city experienced severe container shortages, delays in shipments, and skyrocketing shipping costs, particularly to key markets like Europe and the U.S., where shipping rates rose by over 200% during the peak of the pandemic (UNCTAD, 2022), as depicted in Figure 8. The disruptions revealed the fragility of the city's logistics networks, emphasizing the need for greater resilience and diversification in supply chains.

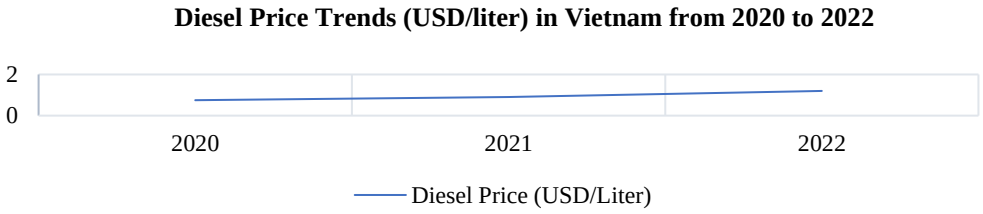


Figure 7: Diesel Price Trends in Vietnam (2020–2022).

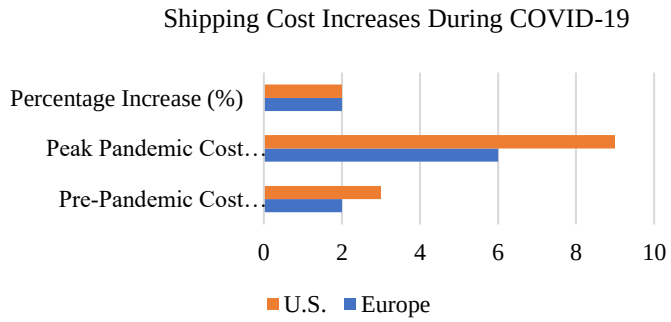


Figure 8: Shipping Cost Increases During COVID-19.

4. OPPORTUNITIES FOR GROWTH AND TRANSFORMATION

Beyond the challenges outlined above, Ho Chi Minh City (HCMC) possesses significant advantages that position it to transform its logistics sector into a sustainable and resilient hub. By harnessing the power of digital technologies, embracing green logistics initiatives, leveraging its strategic location within ASEAN, and fostering public-private partnerships (PPPs), HCMC has the potential to redefine its logistics landscape. Capitalizing on these strengths will enable the city to enhance its operational efficiency, mitigate environmental impacts, and solidify its competitiveness in regional and global markets.

4.1 Digital Transformation

The integration of digital technologies such as the Internet of Things (IoT) and blockchain has already demonstrated promising results in HCMC. For example, IoT-enabled sensors implemented at Cat Lai Port have reduced container dwell times by 15%, showcasing the value of real-time data analytics in improving port efficiency (Viet, 2015). Similarly, blockchain pilot programs at Saigon Newport have cut customs processing times by 25%, highlighting their potential to enhance transparency and streamline administrative processes (Hong, 2020). Singapore's TradeNet system, which uses IoT and blockchain for seamless data exchange among stakeholders, reduced customs clearance times by over 30% and improved cargo handling efficiency at the Tuas Mega Port (Tuas_Mega_Port, 2023). This successful implementation

offers a roadmap for HCMC to expand its digital adoption.

4.2 Green Logistics Initiatives

Green logistics initiatives are critical for reducing HCMC's environmental footprint. In Amsterdam, the logistics sector has achieved significant emissions reductions by mandating EV adoption for last-mile deliveries and incentivizing renewable energy usage in logistics hubs. This model aligns with HCMC's need for policy incentives to accelerate green logistics adoption. The deployment of electric vehicles (EVs) is a viable strategy; for instance, Grab's electric bike program has successfully reduced urban air pollution, demonstrating the potential of EVs for last-mile deliveries (Quan et al., 2022). Additionally, renewable energy-powered warehouses are becoming increasingly relevant. Solar-powered facilities in the Tan Thuan Export Processing Zone (EPZ) are projected to reduce energy costs by 20%, offering both economic and environmental benefits (Tran, Le, & Tran, 2017).

4.3 Strategic Location

HCMC's strategic location within ASEAN, coupled with its integration into the Belt and Road Initiative (BRI) and the Regional Comprehensive Economic Partnership (RCEP), positions it as a vital logistics hub. Infrastructure upgrades, such as improved rail and road connectivity to neighboring provinces, have enhanced transit times and supported cross-border trade. These developments make HCMC an attractive destination for global supply chains, particularly for industries seeking efficient access to Southeast Asian markets (Asian_Development_Bank, 2023a). Shanghai has leveraged its strategic position in the BRI to become a global logistics hub, with infrastructure investments in rail corridors and smart ports reducing transit times by over 20%. HCMC can replicate these practices to strengthen its competitiveness.

4.4 Public-Private Partnerships

Public-private partnerships (PPPs) provide a vital mechanism for financing and implementing sustainable logistics initiatives in HCMC. These collaborations can drive the adoption of EV fleets, fund the development of logistics parks, and support the integration of advanced technologies. For example, government-supported EV trials with private logistics operators could accelerate broader adoption and build public trust. One of the successful cases is the Port of Rotterdam (De Langen & Heij, 2014). Collaborative efforts between the Dutch government and private stakeholders funded hydrogen-powered vehicles and green logistics corridors, reducing emissions by 30% (Dooms, Van Der Lugt, & De Langen, 2013). This model underscores the importance of PPPs for scaling sustainability in HCMC.

5. VISION FOR 2050 AND RECOMMENDATIONS

Ho Chi Minh City aspires to become a global logistics hub by 2050, combining cutting-edge technologies, sustainable practices, and resilient infrastructure to overcome existing challenges and capitalize on emerging opportunities. The vision emphasizes digital transformation, green logistics, infrastructure modernization, workforce development, and international collaboration as key pillars to foster economic growth, environmental sustainability, and operational resilience.

5.1 Digital Transformation: A Catalyst for Logistics Innovation

Digital technologies will revolutionize HCMC's logistics sector by enhancing efficiency, transparency, and adaptability. AI and machine learning will optimize route planning, reduce delivery times, and predict consumer demand. For example, AI-driven predictive analytics can help logistics firms anticipate disruptions caused by extreme weather and proactively reroute shipments. IoT-enabled sensors will ensure real-time monitoring and efficient management of goods, particularly in cold chain logistics for temperature-sensitive exports like seafood and pharmaceuticals. Blockchain technology will enhance supply chain transparency, certifying the origins of agricultural exports like rice and coffee to meet stringent international standards. Autonomous vehicles and drones will redefine last-mile delivery by addressing traffic congestion, while unified digital platforms like Singapore's TradeNet will facilitate seamless collaboration among stakeholders.

5.2 Green Logistics: A Path Toward Sustainability

HCMC aims to integrate sustainability into its logistics sector by embracing green logistics initiatives. Electrification of freight fleets will reduce emissions, DHL's adoption of EVs globally and Copenhagen's integration of sustainable

urban logistics provide a roadmap for HCMC to achieve similar goals. Companies like Giao Hang Nhanh (GHN) are encouraged to adopt EVs through subsidies and tax incentives (Lê, 2023). Renewable energy will power logistics hubs, as demonstrated by solar-powered warehouses in Tan Thuan Export Processing Zone. Circular economy practices, including reverse logistics systems for packaging reuse, will minimize waste. Expanding Coca-Cola Vietnam's bottle collection initiative citywide will further embed sustainability into supply chains. Moreover, green transport corridors with low-emission zones and dedicated freight lanes will alleviate urban pollution.

5.3 Infrastructure Modernization for a Resilient Logistics Network

Infrastructure development will underpin HCMC's logistics transformation. Smart ports with AI-driven systems and autonomous cranes will streamline port operations, reducing congestion and improving cargo throughput. Multimodal transport networks, integrating road, rail, and waterways, will optimize freight movement. The Saigon River, for instance, could be enhanced as a key transport route. Long Thanh International Airport, set to open in 2026, will serve as a critical hub for high-value goods like electronics and pharmaceuticals, further bolstering HCMC's logistics capacity (T. L. Nguyen et al., 2023). Climate-adaptive infrastructure, such as flood-resistant warehouses and elevated roads, will mitigate the impact of extreme weather events

5.4 Policy Support and International Collaboration

Supportive policies and global partnerships will accelerate HCMC's logistics transformation. Incentives under Vietnam's Logistics Development Plan (2021–2030) will reduce logistics costs and promote digitalization. Free trade agreements (FTAs) like the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership (RCEP) will attract foreign investment and facilitate global market access. Collaborating with ASEAN nations through the ASEAN Smart Logistics Network (ASLN) will strengthen cross-border trade, with initiatives like the Vinh Phuc ICD Logistics Center serving as a model for HCMC.

5.5 Workforce Development and Innovation Ecosystems

Human capital and innovation ecosystems are integral to HCMC's logistics success. Specialized training programs, in collaboration with institutions like the Vietnam Logistics Research and Development Institute, will equip workers with skills in AI, IoT, and blockchain. Establishing innovation hubs will encourage startups to develop tailored solutions, while fostering diversity in leadership will drive innovation.

6. RESILIENCE IN THE FACE OF CLIMATE AND GLOBAL DISRUPTIONS

HCMC will build resilience into its logistics systems to mitigate risks from climate change and global uncertainties. Climate-adaptive infrastructure, such as elevated roads and robust drainage systems, will protect operations from flooding. AI-powered predictive analytics will forecast risks and enable real-time rerouting of shipments during extreme weather. Diversifying trade routes and partners will reduce dependency on specific markets, ensuring stability during geopolitical shifts. The Netherlands' flood-resistant designs and UPS's predictive models in the U.S. demonstrate effective risk mitigation strategies that HCMC can adopt. In conclusion, Table 1 shows the roadmap of HCMC to develop a sustainable and resilient logistics industry in the digital era: a vision to 2025.

Table 1: HCMC's Vision 2050 Roadmap.

Category	Goal	Target Year
Digital Transformation	Full integration of AI, IoT, and blockchain	2050
Environmental Goals	Electrification of freight fleets	2040
Infrastructure	Completion of multimodal transport networks	2035

7. CONCLUSION

Ho Chi Minh City has the potential to transform into a global leader in sustainable and resilient logistics by 2050. The city's strategic location, coupled with its growing economic significance, presents a unique opportunity to modernize its logistics sector. However, achieving this vision requires addressing persistent challenges such as infrastructural inadequacies, environmental impacts, and fragmented policies. By embracing digital transformation, integrating green logistics practices, and fostering public-private partnerships, HCMC can build a future-ready logistics ecosystem. Critical

initiatives include adopting advanced technologies like AI, IoT, and blockchain; promoting electrification of transport fleets; developing multimodal transport networks; and aligning with global sustainability goals. Moreover, policy support, workforce development, and international collaboration are essential to drive innovation and competitiveness. A well-executed, forward-looking strategy will enable HCMC to enhance its operational efficiency, reduce environmental impacts, and ensure resilience against future disruptions. By prioritizing sustainability and technological innovation, the city can not only strengthen its position as Vietnam's logistics hub but also contribute significantly to the global shift toward sustainable supply chains. This transformation will ensure HCMC remains a competitive, sustainable, and prosperous city in the digital era.

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WHAT MAKES ATHLETES COME BACK TO MARATHON EVENTS: A STUDY IN HANOI

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ABSTRACT

Marathons are large-scale events that capture a wide range of social interests. This paper analyzes factors influencing athletes intending to come back to two famous marathons in Hanoi: the Long Bien Marathon, the city's oldest marathon, and the VnExpress Hanoi Midnight Marathon, one of the largest events in the city. The study collected data from 147 participants through online and offline surveys. Utilizing Multiple Linear Regression based on the Planned Behavior Model framework, the research concludes that attitudes, subjective norms, and perceived behavioral control all positively influence the athletes' intention to re-purchase marathon running services.

Keywords: "customer satisfaction", "intend to return", "marathon services", "sport events".

1. INTRODUCTION

In recent years, running in Vietnam has seen significant growth both in terms of quantity and quality. In 2013, there were only two marathon events organized: HCMC Marathon and Danang International Marathon. Now, based on the author's quick statistics, there are over 50 marathon and half marathon events organized across the country. The purpose of this study is to analyze the factors influencing the intention to repurchase services at marathon events. This intention is considered an indirect measure of the event's success. The rate at which athletes return to the races reflects customer satisfaction and loyalty to the services provided by these marathon organizers. Currently, there is little research on this particular issue.

The study focuses on collecting data from two famous marathon events in Hanoi: Long Bien Marathon (LBM) and VnExpress Hanoi Midnight Marathon (VHMN). LBM is the first marathon event organized in Hanoi, experiencing rapid growth from 700 participants in 2016 to over 10,000 participants in 2022. The second event under investigation is the VHMM, a relatively new marathon organized by a reputable organizer in Vietnam. Despite being held for the first time in 2018 and the second time in 2020, the marathon has quickly developed into one of the largest running events in Vietnam, attracting approximately 10,000 participants in 2022.

Most previous studies assert that service quality is a significant factor influencing overall customer satisfaction in tourism contexts (Cole & Illum, 2006; Jain, 2018; Naylor & Kleiser, 2002; Lee, 2009). It's essential to mention "service" because it encompasses satisfaction with various aspects of the event: the performance of staff, the atmosphere of the event, and catering services (Lee, 2009). There is a common belief that high-quality service leads to tourist satisfaction, then they are likely to spread positive information and become repeat visitors (Cole & Illum, 2006). Festival attendees are more satisfied when they perceive higher quality in cleanliness, visual appearance of the festival venue, and a sense of safety (Naylor & Kleiser, 2002).

Numerous studies have been conducted to examine the relationship between tourist satisfaction and destination attributes. Attribute factors such as the attractiveness of facilities and service quality have been shown to impact tourist satisfaction (Jain, 2018). Customer satisfaction is based on the alignment between expectations of a destination: preconceived images of the destination and the perceived experience at the destination: what tourists see, feel, and achieve in the destination experience (Jain, 2018). The impact of perceived service quality on behavioral intention is manipulated by satisfaction during the customers' experience, particularly in the tourism industry (Baker & Crompton, 2000).

Other factors also impact tourist satisfaction, such as price, accessibility, food quality, accommodation, and motivation (Chang et al, 2017; Jain, 2018; Maichum et al, 2016; Lee, 2009). Price has a lesser impact on loyalty, satisfaction, and word-of-mouth marketing. In contrast, accessibility has a higher influence on customer satisfaction (Lee, 2009). Controllable environmental features, such as food quality and program content, influence customer emotions,

including consumer satisfaction (Maichum et al, 2016).

In previous studies, several factors that influence customers' intention to return have been identified, such as experience and customer satisfaction (Ajzen, 1991; Alegre, 2006; Bigne et al, 2007; Chi & Qu, 2008; Meng et al, 2008; Kaplanidou & Vogt, 2010; Lee & Beeler, 2009). Experience is a crucial factor in determining the intention to return (Ajzen, 1991). In the context of participating in a marathon, athletes rely on their experiences to form the intention to return (Beech & Chadwick, 2007).

Past behavior does not significantly impact the intention to return to tourism and sports tourism (Meng et al, 2008). In their study, past behavior related to sports events was measured by an open-ended survey asking respondents to indicate the number of times they had participated in a specific sports event in the past five years, including events in the current year. In the tested path model, past behavior with the event was not identified as a significant predictor of the intention to participate again in the event. When making decisions about participating in sports events, combined with travel plans, the influence of past behavior is not straightforward, as sports tourists may consider participating in other locales for travel purposes. The other researchers also do not find the impact of customer satisfaction on customer intentions to return (Godin & Kok, 1996; Maichum et al, 2016).

2. MATERIAL AND METHOD

The research uses the Planned Behavior Model as the theoretical framework. The independent variables in the model are measured using observed variables, specifically as follows:

Table 1. The variables in the model

Variables	Observational Variables
attitude	attitude1: attitude on running experience
	attitude2: attitude on travel experiences outside of running events
	attitude3: attitude on general locations
	attitude4: attitude on race atmosphere
	attitude5: attitude on volunteer participation in the race
	attitude6: attitude on public emotions towards athletes
	attitude7: attitude on personal performance improvement
	attitude8: attitude on many acquainted friends participating
	attitude9: attitude on combining the trip with other work responsibilities
subjective norm	norm1: participating in running events is beneficial for health
	norm2: people around admire me when I participate in running events
	norm3: people frequently engaged in sports training are good citizens
	norm4: people regularly engage in sports are friendly
	norm5: participating in running events allows me to promote a healthy lifestyle to others
	norm6: the weather in this season is suitable for running and outdoor activities
	norm7: outdoor activities are better for health than indoor activities
perceived behavioral control	control1: financial capability
	control2: time availability
	control3: support from family members
	control4: convenience in traveling to the running event
	control5:ease of accommodation
decision to repurchase the running event services	deci1: high competitiveness of the race
	deci2: well-known race with strong media coverage
	deci3: professional event organizers
	deci4: good quality running tracks
	deci5: attractive giveaways: shirts, medals

	deci6: season-appropriate weather

The research tests following hypotheses:

– H1: Attitudes positively influence the decision to return and repurchase running event services.

– H2: Subjective norms positively influence the decision to return and repurchase running event services.

– H3: Perceived behavioral control positively influences the decision to return and repurchase running event services.

The data was used to collect both online and offline. The survey targeted athletes participating in two famous marathons in Hanoi: LBM 2023, held on October 30, 2022, and VHMM 2023, held on November 26, 2022. The study collected a total of 147 samples, consisting of athletes participating in various race distances.

After collecting preliminary data, data were processed by following steps. Firstly, we evaluate data by examining reliability and assessing the convergence validity of the factors in the model. Subsequently, we performed a formal assessment of the measurement scale. Finally, we evaluated differences between categorical variables with the intention to return. The study utilized statistical methods such as the independent samples t-test, and analysis of variance (ANOVA) for each participant group based on different ages, incomes, and professions, with a confidence level of 95%.

3. RESULT AND DISCUSSION

A total of 147 survey forms were collected, consisting of 122 offline results and 25 online ones. Table 2 provides a systematic overview of the survey participants.

Table 2. Descriptive Statistics of Survey Results

Criteria	Quantity	Percentage (%)	Criteria	Quantity	Percentage (%)
1. Gender			**4. Income**		
Female	106	72.1			
Male	41	27.9	Under 5 million	14	9.5
2. Age			5 to 10 million	25	17.0
18 to 24	19	12.9	11 to 20 million	62	42.2
25 to 40	85	57.8	21 to 30 million	20	13.6
41 to 60	19	12.9	Over 30 million	26	17.7
Over 60	24	16.3	**5. Intention to Participate Again in the Future**		
3. Running Distance					
5 km	11	7.5	Definitely participate	108	73.5
10 km	27	18.4	Consider	39	26.5
21 km	73	49.7	Not participate	0	0
42 km	36	24.5			

According to the survey results, 108 athletes intend to return to the races in the future with confidence, accounting for 73.5% of total surveys. Only 39 individuals, constituting 26.5%, indicated that they would consider returning to the races. Last but not least, none of the respondents stated that they would not participate in the races again.

Cronbach's Alpha tests indicate that the observed variables have correlation coefficients greater than 0.3, and Cronbach's Alpha coefficients greater than 0.7. The reliability assessment results using Cronbach's Alpha coefficient show that all measures and observed variables meet the requirements. The EFA results indicate that the variables in the model are all greater than 0.5, demonstrating that the observed variables are usable and meaningful, ensuring the convergence of each measure in the model. Bartlett's test shows that the Kaiser-Meyer-Olkin (KMO) coefficient is 0.877, falling within an acceptable range ($0.5 < KMO < 1$). The significance value (Sig. = 0.000) is less than 0.05, indicating that the observed variables are correlated with each other overall and are suitable for factor analysis.

The Principal Component Analysis (PCA) method was used for factor extraction in this study, resulting in six

factors with an Eigenvalue of 1.521. No new factor was formed. The extracted variance was 61.237%, acceptable. Thus, the extracted variance meets the requirements. After conducting the EFA model on the independent variables, all twenty one observed variables met the EFA standards. The results of the Pearson correlation test indicate that the variables in the model are linearly correlated with each other.

Multivariate regression analysis shows that the Variance Inflation Factor (VIF) values for the independent variables range from 1.194 to 1.396, all of which are less than 10, indicating no issue of multicollinearity. The adjusted R-squared value is 0.522, slightly less than the R-squared value of 0.532, meaning that the independent variables explain 52.2% of the variance in the dependent variable (impulse buying behavior). The Durbin–Watson statistic is 1.569, within the range of 1.5 to 2.5, indicating no first-order autocorrelation. The F-test significance (Sig) is 0.000 < 0.05, suggesting that the linear regression model is suitable for the dataset.

The t-test significance (Sig) for the regression coefficients of the independent variables Attitude, perceived behavioral control, and subjective norms is less than 0.05, indicating that these three independent variables are accepted and significant in explaining the dependent variable. Additionally, the Beta coefficients for the three independent variables attitude, perceived behavioral control, and subjective norms are greater than 0, showing a positive influence on the dependent variable. The multivariate regression equation is:

$$Deci=1.279 +0.241\cdot attitude +0.167\cdot norm +0.444\cdot control +Ei \quad (1)$$

We conduct an One Way ANOVA Test for age, incomes and professions. and the Intention to Return. We observe that the Sig values of variables in the ANOVA table are all greater than 0.05. Therefore, we conclude that there is no statistically significant difference in the intention to repurchase running event services among surveyed athletes of different ages, incomes, and professions.

4. CONCLUSION

The study analyzes factors influencing athletes' decision to repurchase running services in Hanoi. It has constructed and tested a multiple linear regression model under the Planned Behavior Model framework. The objectives outlined in the research are presented through descriptive statistics, reliability analysis, factor analysis, regression analysis, and examination of common correlations in the process of building the research model to evaluate and analyze the factors influencing the decision to repurchase marathon running services in Hanoi.

The regression coefficients of the three independent variables: attitude, perceived behavioral control, and subjective norms, are all greater than 0 and carry a positive sign. This indicates that these three independent variables positively impact the decision to return to purchase marathon running services in Hanoi with a 95% confidence level (sig < 0.05). Thus, hypotheses H1, H2, and H3 are accepted.

Based on the magnitude of the standardized beta regression coefficients, the order of the impact from strongest to weakest of the independent variables on the dependent variable is perceived behavioral control (0.444) > attitude (0.241) > subjective norms (0.167). Therefore, perceived behavioral control are the factor with the strongest impact on the intention to repurchase marathon running services in Hanoi. Attitude and Subjective norms still have a certain impact on this intention.

In summary, based on the results of the survey data analysis in the research model, we conclude with several points:

Firstly, the research has demonstrated the validity of the study hypotheses and the proposed model, including three independent variables and one dependent variable. The hypotheses, H1: Attitude positively influences the decision to return to purchase marathon running services. H2: Subjective norms positively influence the decision to return to purchase marathon running services. H3: Perceived behavioral control positively influence the decision to return to purchase marathon running services, are all reasonable hypotheses.

Secondly, through the ANOVA analysis, the research found that there is no statistically significant difference in the intention to repurchase marathon running services among athletes from different professions, different age groups, and different income levels.

Thirdly, the decision to return to purchasing marathon running services in Hanoi is most strongly influenced by the perceived behavioral control factor. Through the survey on income, it is observed that 14 individuals, accounting for 9.5%

of survey participants, have an income below 4 million Vietnamese dong (VND) per month. For those with an income ranging from 5 to 10 million VND per month, there are 25 individuals, making up 17%. Individuals with an income from 11 to 20 million VND account for 62 people, or 42.2%. Those with an income from 21 to 30 million VND per month include 20 individuals, representing 13.6%. Finally, 26 individuals, or 17.7%, have an income exceeding 30 million VND. Through the survey, it is evident that over 70% of survey participants have an income of 11 million VND per month or more in various running events. Consequently, this indicates that their financial capability, good timing, and convenience in transportation contribute to a higher likelihood of deciding to return to purchase marathon running services. Therefore, the conclusions drawn in this study align well with the model and are meaningful.

The article also has some existing limitations. Firstly, beyond the topic factors that the study has investigated, there are influences on the decision to return to purchasing running event services that the group has not explored. Therefore, in the future, it is necessary to further investigate the impact of other factors on the decision. Additionally, expanding the research scope will make the study results more comprehensive. Secondly, the research scope is limited to a few running events in Hanoi, so the understanding of factors or decisions affecting the decision to return to purchasing running event services is not comprehensive. Future research directions may involve surveying multiple groups of athletes participating in different running events, making the practical significance more effective and the model's significance more reliable. Thirdly, some factors such as perceived behavioral control or could be further explored in detail, helping to better understand the mechanism. This way, the recommendations will be more justified and have a more practical application.

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RISK MANAGEMENT IN BANK INCOME DIVERSIFICATION STRATEGY DISCOVERING RESEARCH TRENDS THROUGH BIBLIOGRAPHY ANALYSIS

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ABSTRACT

This study analyzes risk management in bank income diversification strategy using bibliometric methods, particularly applying advanced tools such as VOSviewer and Biblioshiny, to systematically explore global research trends. Income diversification, particularly from non-interest income sources, has gained prominence in enhancing operational efficiency and mitigating financial risks. However, it also presents challenges such as increased management costs and compliance complexities. This research systematically explores global research trends using data from Scopus and Web of Science, employing advanced bibliometric techniques to analyze co-authorship networks, keyword relationships, and influential research contributions. The results highlight key trends and the role of risk management in optimizing income diversification strategies, particularly in emerging markets. The findings offer a scientific basis for developing sustainable management strategies.

***Keywords**: "*Bibliometric Analysis", "Income Diversification", "Non-Interest Income", "Risk Management".

1. INTRODUCTION

The banking industry has transformed significantly due to globalization, technological advancements, and regulatory changes. Among these, income diversification has become a crucial strategy for enhancing profitability and reducing risk (Bessis, 2015). However, managing risks associated with diverse income streams remains a challenge (Githaiga, 2022). Effective risk management is essential for maintaining banking stability and efficiency. Bibliometric analysis provides valuable insights into research trends on risk management and income diversification (Rastogi, Sharma, Pinto, & Bhimavarapu, 2022). By examining patterns and key contributions in the literature, this method helps identify emerging themes and intellectual structures in banking risk management (Sang, 2024; Zouaoui & Zoghlami, 2023). This approach has gained significance, particularly after global financial crises, underscoring the need for robust and adaptable risk management strategiess (Qi et al., 2023).

Three critical factors in banking risk management are financial stability, regulatory compliance, and operational resilience (Goetzmann, Brown, Gruber, Elton, & Sons, 2014; Laeven & Levine, 2009; Rose & Hudgins, 2008). These elements interact with income diversification, presenting both opportunities and risks (Cade, 2013). While diversification can reduce dependence on interest revenue, it can also introduce new risks such as market volatility and operational complexity (Githaiga, 2022; Hsieh, Chen, Lee, & Yang, 2013). Understanding these dynamics is crucial for developing risk management frameworks. This study applies bibliometric analysis, leveraging Scopus and Web of Science data with tools such as VOSviewer and Biblioshiny, to clearly illustrate the connections between applied theoretical frameworks (Basel framework and portfolio diversification theory) and the analytical results regarding risk management in bank income diversification. By leveraging Scopus and Web of Science data, it identifies key themes, influential research, and emerging trends. The findings contribute to a deeper understanding of theory and practice in banking risk management (Githaiga, 2022). The study clarifies the relationship between income diversification and risk management while offering practical insights for policymakers, practitioners, and researchers. In the era of digital transformation and economic uncertainty, these findings are particularly relevant as banks navigate evolving financial landscapes (Addy et al., 2024).

2. MATERIAL AND METHOD

2.1. Theoretical overview

2.1.1. Risk management and income diversification in banking

Risk management is essential for banking stability and growth, particularly as banks expand non-interest income sources such as service fees, financial investments, and new products. While these streams enhance profitability, they

also introduce risks like resource imbalances, higher costs, and operational failures (Hsieh et al., 2013; Zouaoui & Zoghlami, 2023). Market volatility, including fluctuations in interest and exchange rates, adds further complexity (Nguyen & Nguyen, 2024). Without proper management, diversification can increase operational risks and financial losses (Githaiga, 2022). Advanced risk management tools, such as predictive analytics and AI, help mitigate these risks (Qi et al., 2023). Digital transformation enhances risk management by leveraging Big Data analytics to predict risks and respond swiftly to market changes (Addy et al., 2024). Semenyuta and Shapiro (2023) highlight that digitalization improves efficiency and strengthens the detection of non-financial risks, including regulatory compliance. However, technology must integrate with traditional risk management frameworks. Rastogi et al. (2022), stress that combining quantitative risk analysis with proactive strategies is essential. Given global economic uncertainties, banks must implement sustainable and flexible risk management strategies to adapt to an evolving financial landscape.

2.1.2. Bibliometric analysis

Bibliometric analysis is a quantitative method for mapping the knowledge structure of a research field, identifying key trends, influential authors, and emerging topics (N. Van Eck & Waltman, 2010). Using data from Scopus and Web of Science, it provides insights into risk management and income diversification in banking (Passas, 2024; N. J. Van Eck & Waltman, 2014). Tools like VOSviewer and Biblioshiny help analyze co-authorship networks, keyword co-occurrence, and citation trends (Aria & Cuccurullo, 2017). VOSviewer visualizes research networks, while Biblioshiny enables detailed citation analysis, enhancing understanding of banking research (Rastogi et al., 2022). This study applies bibliometric analysis to examine risk management and income diversification (Patel, Migliavacca, & Oriani, 2022; N. J. Van Eck & Waltman, 2014). The process includes filtering studies, cleaning data, and conducting network analysis. By identifying research gaps and trends, the findings contribute to a deeper understanding of banking risk management and suggest future research directions (Zouaoui & Zoghlami, 2023).

2.1.3 Applied theory in analysis

Basel Framework and Risk Management in Banking

The Basel Framework, developed by the Basel Committee on Banking Supervision (BCBS), enhances banking stability and resilience. Basel I, II, and III address evolving risk factors, with Basel II emphasizing capital management, regulatory supervision, and risk weighting (Hsieh et al., 2013). After the 2008 financial crisis, Basel III introduced stricter capital and liquidity requirements, including Tier 1 capital ratios, leverage ratios, and short-term liquidity ratios (Zouaoui & Zoghlami, 2023). Implementing Basel standards improves banks' resilience to financial shocks, enhancing customer and investor confidence. According to Berger, Hasan, Korhonen, and Zhou (2010) Basel III compliance promotes sustainable banking by improving capital management, reducing risks, and increasing adaptability to financial fluctuations. This framework strengthens financial stability and ensures long-term growth in the global banking sector.

Portfolio diversification theory

Markowitz's portfolio diversification theory highlights how combining low-correlation assets can reduce overall risk without impacting expected returns (Githaiga, 2022). In banking, this theory applies to income diversification, including fee-based income, equity investments, and non-interest products, helping banks optimize profits while minimizing operational and market risks (Rastogi et al., 2022). Diversification reduces dependence on traditional income sources like loans and interest, enhancing financial stability, especially in volatile conditions (Githaiga, 2022). However, effective implementation requires strong risk management, accurate market data, and advanced analytical tools such as risk prediction models and integrated information systems (Rastogi et al., 2022). The study of Elsas, Hackethal, and Holzhäuser (2010) emphasize that the success of diversification depends on aligning bank strategies with market conditions. While diversification enhances resilience, it also presents challenges in data management and regulatory compliance. To maximize benefits, banks must integrate modern risk assessment tools and strategic planning to ensure optimal efficiency.

Combination of two theories

The combination of the Basel framework and portfolio diversification theory creates a comprehensive strategy for risk management and optimizing bank performance. The Basel framework provides fundamental principles for capital management and credit risk mitigation, while diversification theory supports the optimization of income streams by

minimizing dependence on single activities Hsieh et al. (2013). It is shown that when these two theories are applied together, banks not only achieve a balance between risk and return but also enhance their ability to adapt to rapid changes in the economic and technological landscape. Research by Berger et al. (2010) and Zouaoui and Zoghlami (2023) have confirmed that banks that adopt both approaches tend to achieve long-term stability, especially during periods of economic uncertainty. Furthermore, the support of financial technology and digital transformation has increased the effectiveness of combining these strategies, helping banks not only mitigate risks but also exploit growth opportunities in the digital era.

2.2. Research methods

2.2.1. Data Collection and Processing

Data were collected from Scopus and Web of Science using advanced search queries to ensure accuracy and relevance. Scopus, with over 90 million records, provides a rich source for multidisciplinary research (Pranckutė, 2021). Web of Science offers extensive scholarly literature and analytical tools for evaluating citation links and research trends (Passas, 2024). The dataset was built using keywords: "Income Diversification" OR "Risk Management" OR "Banking Bibliometric Analysis.". The data collection followed rigorous screening steps. First, documents were limited to the 2000–2024 period to ensure relevance (Githaiga, 2022). Only English-language research articles were included, as they provide detailed academic analyses (Rastogi et al., 2022; N. J. Van Eck & Waltman, 2014). Collected data were processed to remove duplicates and irrelevant papers, enhancing accuracy and practical value (Aria & Cuccurullo, 2017). The selection of these sources ensures reliability and helps identify key trends in risk management and income diversification in banking (Sang, 2024). The final dataset included 5,430 unique studies after filtering 39.340 papers by relevance, time frame, and language. These refinements establish a solid foundation for further in-depth analysis and after removing duplicates, the final dataset consisted of 5.430 unique studies (Table 1).

Table 1: Data Filtering Process

Criteria	Scopus	Web of Science	Total
Initial search results	23.540	15.800	39.340
Filtered by "Finance & Banking"	5.630	4.920	10.550
Filtered by time (2000-2024)	3.890	3.540	7.430
Duplicates removed	2.890	2.540	5.430

Source: Author's synthesis

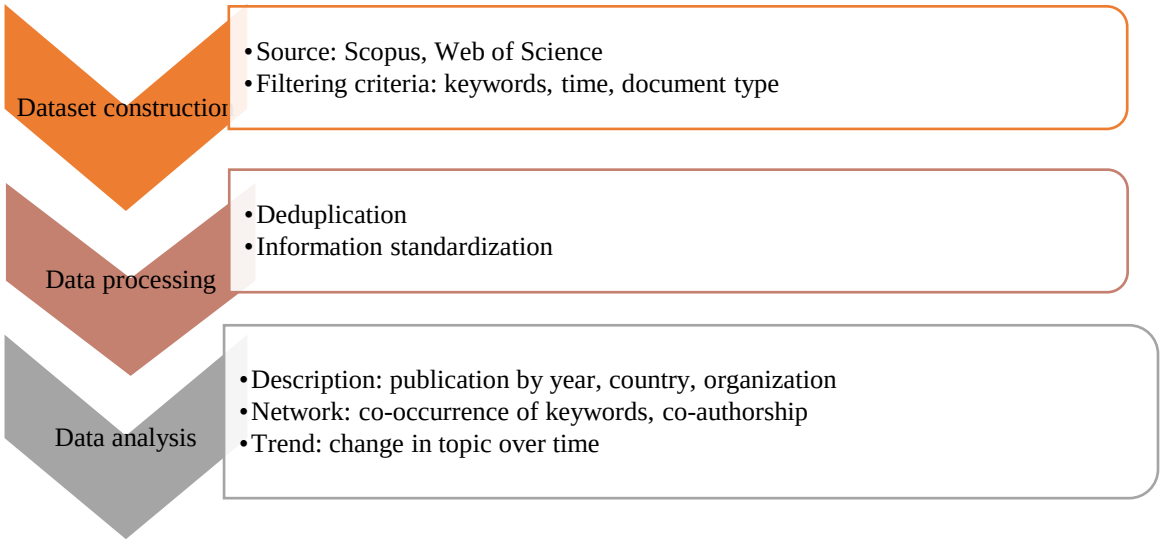
2.2.2. Analysis tools

This study used VOSviewer, a widely used bibliometric analysis tool for mapping and visualizing research networks. It effectively analyzes co-occurrence links, co-authorship, and citation networks, helping researchers identify topic clusters, key research centers, and trends (N. Van Eck & Waltman, 2010). VOSviewer operates through a multidimensional positioning algorithm, displaying keywords or authors based on their connectivity. Its visual network diagrams use color-coded thematic clusters and varying line thicknesses to illustrate relationships. This allows for identifying unexplored areas within a research field. A key advantage of VOSviewer is its ability to process large datasets from Scopus and Web of Science, ensuring reliable and reproducible results (Waltman, Van Eck, & Noyons, 2010). In this study, VOSviewer applied to map keyword co-occurrence and co-authorship networks, providing insights into the knowledge structure of risk management and income diversification in banking.

2.2.3. Analysis process

The analysis process consisted of three main phases: dataset construction, data processing, and data analysis. First, dataset construction involved collecting data from Scopus and Web of Science, filtering it using relevant keywords such as "Income Diversification," "Risk Management," and "Banking Bibliometric Analysis", covering the period 2000–2024. Next, during data processing, the dataset was cleaned by removing duplicate records and irrelevant articles, ensuring consistency and accuracy (Qi et al., 2023). Finally, data analysis was conducted in three stages. Descriptive analysis evaluated key indicators such as the number of publications per year, leading research institutions, and high-impact journals. Network analysis, performed with VOSviewer, identified key authors, keyword co-occurrences, and research

linkages. Trend analysis examined the evolution of research topics over time, providing insights into how the field has changed. This structured approach not only enhanced the understanding of banking risk management and income diversification but also helped identify potential research gaps (Figure 1).

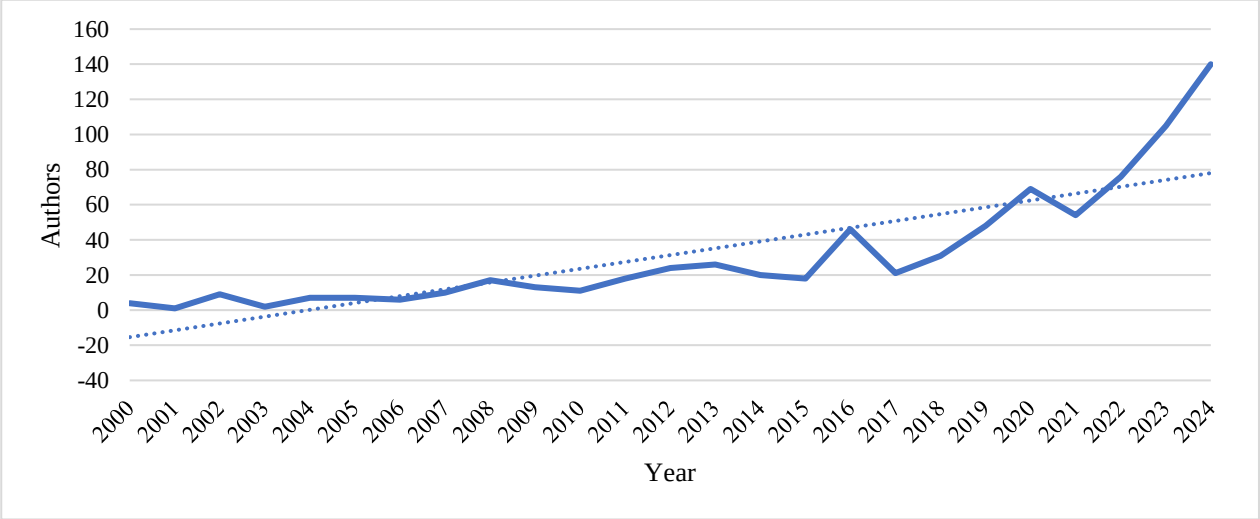


Source: Author's synthesis

Figure 1: Data analysis process

3. RESULT AND DISCUSSION

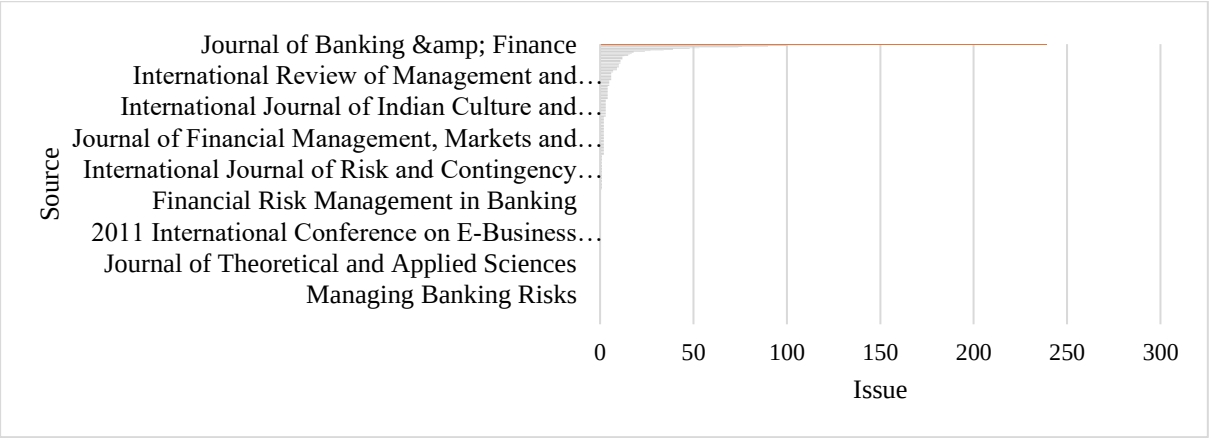
3.1. Overview of the number of published works by year



Source: Author's synthesis

Figure 2: Growth in the number of published works by year

Research on income diversification and risk management in banking has grown significantly since 2016, with a sharp rise from 2020 (Figure 2). The period 2000–2015 saw steady but slow growth, while increased interest in "Income Diversification," "Risk Management," and "Banking Bibliometric Analysis" drove a surge in publications. This trend reflects a global focus on bank performance, risk management, and digital transformation. The spike in 2020–2024 is linked to technological advancements and economic fluctuations, emphasizing the relevance and urgency of current research in the financial sector.



Source: Author's synthesis

Figure 3: Number of research papers published in top journals

The Journal of Banking & Finance and SSRN Electronic Journal are the leading platforms for research in finance and banking (Figure 3). The Journal of Banking & Finance focuses on risk management, income diversification, and bank performance, publishing a significant share of studies. The SSRN Electronic Journal facilitates rapid publication of theoretical and empirical research, shaping emerging trends. Both journals play a crucial role in advancing research on digital transformation and income diversification, reflecting the continuous development of these topics in modern banking. Their high impact underscores the growing relevance of these research areas.

3.2. Geographic distribution of research

Bibliometric analysis of Income Diversification, Risk Management, and Banking Bibliometric Analysis (2000–2024) highlights knowledge distribution. A total of 986 articles were published globally, with North America, Europe, and Asia leading contributions. North America, particularly the United States, dominates with 28,40% of publications, supported by top journals like the Journal of Banking & Finance and SSRN Electronic Journal (Adem, 2023; Bauer & Ryser, 2004). Europe also plays a significant role, reinforcing global research trends in banking performance, risk management, and income diversification (Table 2).

Table 2: Contributions of organizations based on their geographical area

Continent	Country	Number of articles	Contribution (%)
North America	USA	280	28.40%
	Canada	40	4.06%
Europe	UK	100	10.14%
	Germany	80	8.11%
	France	50	5.07%
	Italy	50	5.07%
Asia	China	100	10.14%
	Japan	60	6.09%
	South Korea	40	4.06%
	Vietnam	20	2.03%
Oceania	Australia	70	7.10%
	New Zealand	10	1.01%
Africa	South Africa	40	4.06%
	Nigeria	10	1.01%
South America	Brazil	25	2.54%
	Argentina	11	1.11%

Source: Author's synthesis

Figure 4 highlights Europe as a key research hub, with the UK, Germany, and France leading studies on financial policy and banking performance (Beck, Levine, & Loayza, 2000; Kiweu, 2012). Asia has seen rapid growth, particularly in China, Japan, and Vietnam, focusing on digital transformation and income diversification in emerging markets (Hsu & Chiang, 2024; Khan, Goodell, Hassan, & Paltrinieri, 2022; Nguyen-Thi-Huong, Nguyen-Viet, Nguyen-Phuong, & Van Nguyen, 2023). Keywords like "Digital Transformation" and "Operational Efficiency" are increasingly emphasized. Though research in South America, Africa, and Oceania is limited, studies provide valuable insights into risk management and income diversification in developing markets (Horvey & Odei-Mensah, 2024; Bawumia, 2021).

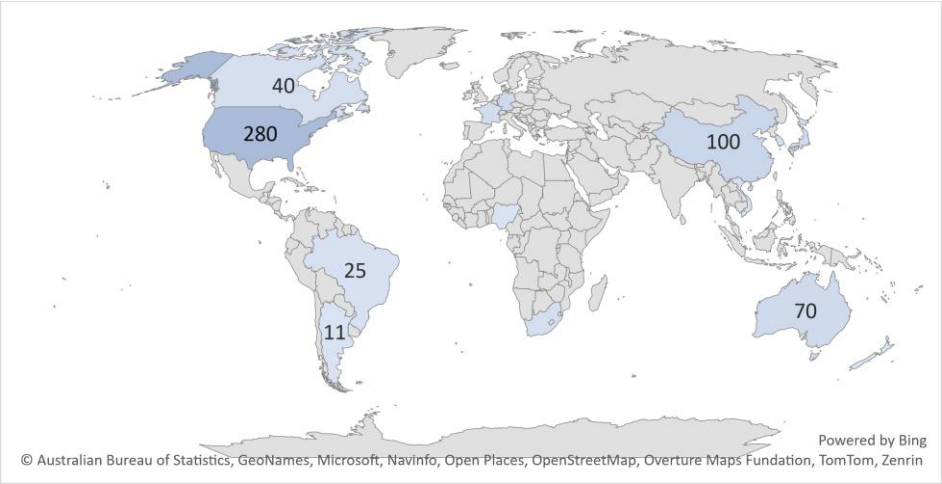


Figure 4: Geographical location of all contributing organizations

Source: Author's synthesis

3.3. Keyword co-occurrence analysis

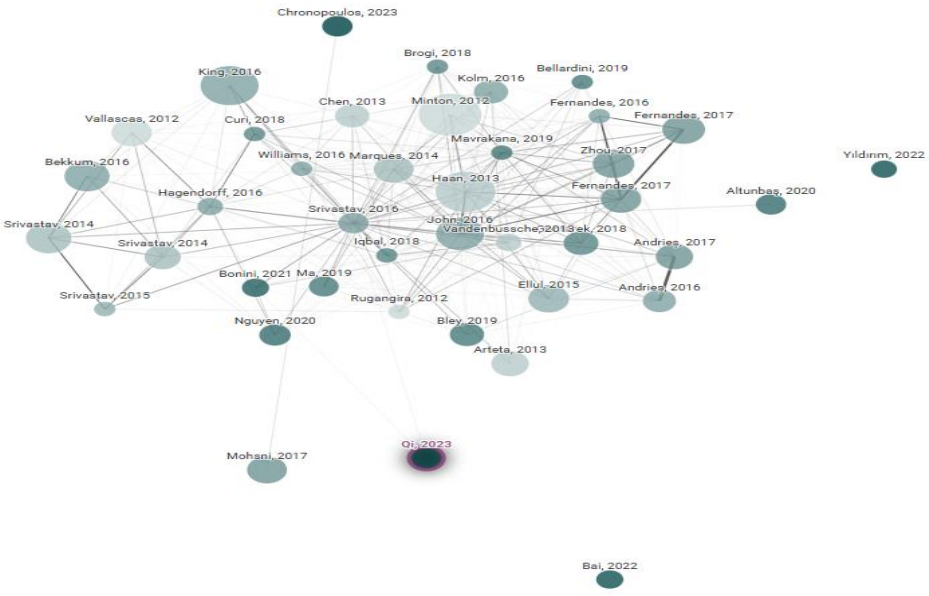


Figure 5: Relationship diagram of related studies

Source: Analysis results from https://www.connectedpapers.com/

Figure 5 illustrates research links on Income Diversification, Risk Management, and Banking Bibliometric Analysis (2000–2024) using Connected Papers. Qi et al. (2023) is the most influential study, focusing on risk management and income diversification in banks. Key works by Srivastav and Hagendorff (2016), Srivastav (2014, 2015) and King, Srivastav, and Williams (2016) serve as foundational REFERENCES. Qi et al. (2023) connects with multiple studies, guiding further research. Bai, Yang, and Elyasiani (2022), though recent, has built strong network connections, highlighting the growing significance of this topic in modern banking.

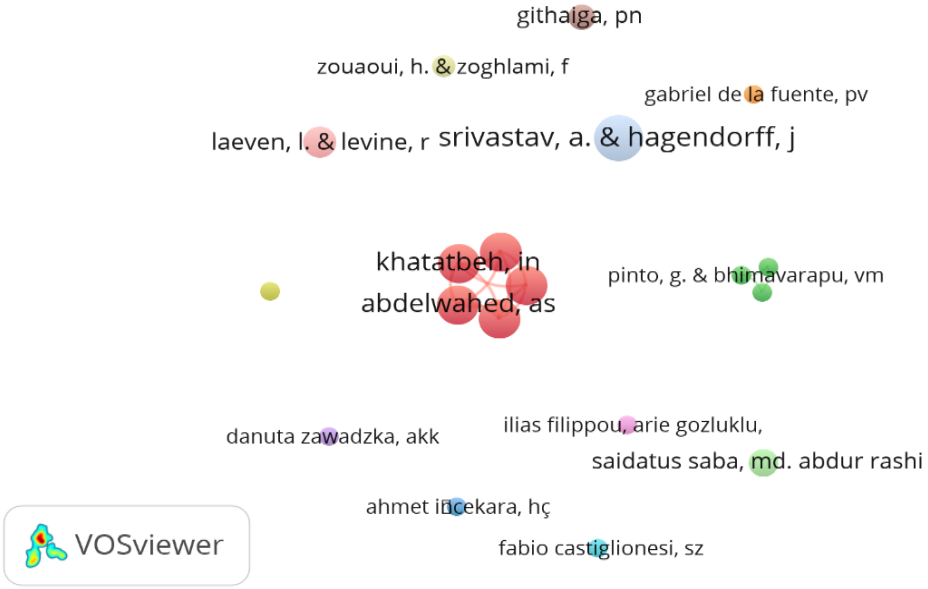


Figure 6: Co-occurrence network of keywords

Source: VOSviewer analysis based on Scopus and Web of Science data, 2024

Figure 6 presents author network analysis using VOSviewer, illustrating collaborations in Income Diversification, Risk Management, and Banking Bibliometric Analysis. Each colored cluster represents authors with shared research interests. Ahmet Ibceka and Harun Çetinkaya focus on risk management and banking efficiency, while Quan Cheng and Shuangbao Zhang contribute to digital transformation studies. Influential works include Semenyuta and Shapiro (2023) on risk management, Bai et al. (2022) on digital banking and Srivastav and Hagendorff (2016) on risk-adjusted efficiency. This highlights the increasing focus on modern banking governance and digital optimization.

4. DISCUSSION

The analysis of the research results shows that risk management plays an important role in the income diversification strategy of banks, especially in the context of globalization and technological development. The results indicate that banks that adopt effective diversification strategies not only improve their profitability but also reduce their financial risks. However, the increase in non-interest income sources also brings challenges, such as high management costs and new risks related to market volatility. In particular, the study shows that banks in developing markets need to pay more attention to building flexible risk management frameworks to adapt to rapid changes in the business environment. Moreover, the application of advanced technologies in risk management, such as artificial intelligence and big data analytics, can create significant competitive advantages. However, further research is needed to determine the specific ways in which banks can integrate these technologies into their management processes. These findings provide valuable insights for policymakers to enhance regulatory frameworks supporting digital transformation and income diversification. Additionally, they suggest specific recommendations for banks to integrate advanced technologies such as artificial intelligence and big data analytics into risk management processes to improve operational efficiency and profitability.

However, a significant gap in current research is the lack of works focusing on the Vietnamese market, which has many unique characteristics. Studies are mainly conducted in developed markets, where banks have undergone comprehensive digital transformation and rich data. Meanwhile, in Vietnam, the digital transformation process in the banking industry is still in its early stages, with many challenges such as limited technological capacity, delays in policy innovation, and a shortage of high-quality human resources. Furthermore, studies on income diversification in Vietnam have not yet clarified the link between expanding non-interest income sources and the ability to improve operating efficiency in a sustainable manner. Specific factors such as bank size, management capacity, and macroeconomic conditions in Vietnam have not been fully integrated into existing models. Therefore, this research gap creates an opportunity for researchers to focus on developing theoretical frameworks and empirical models that are more suitable for the Vietnamese context, especially when the country is strongly promoting its national digital transformation strategy.

5. CONCLUSION

This study provides a bibliometric overview of risk management in banking income diversification strategies. The results reveal key research trends, influential authors, and existing gaps. Banks must enhance their risk management approaches to optimize diversification benefits while mitigating associated risks. Future studies should explore practical applications of digital technologies in banking risk management.

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DIGITAL TRANSFORMATION WITH SOFTWARE AND ELECTRONIC LIBRARY IN TAY DO UNIVERSITY

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ABSTRACT

Data science and information systems with design and construction of databases, data warehouses and digital libraries. Computational methods and application software in university teaching. In-depth research on AI, Machine Learning, Deep Learning, IoT, Big Data,... for digital transformation in Vietnam's education sector, ensuring sustainable development from seizing opportunities and overcoming challenges with the digital transformation program in Vietnam. Practical experience from vocational schools, vocational colleges, skills of skilled workers, promoting effective innovative achievements, developing new factors. The electronic library has the function and task of managing, exploiting, serving and developing learning resources related to the academic, research and management activities of the School; supporting and linking library activities with educational institutions and local libraries to develop and exploit learning resources and electronic documents effectively.

Keywords: website and mobile phone", "software in university teaching", "work skills", "social needs", "smart university library", "the e-environment decree".

1. RESEARCH PROBLEM

The Prime Minister approved the National Digital Transformation Program on June 3, 2020. You can refer to the Digital Transformation Handbook published by the Ministry of Information and Communications, or visit the website dx.mic.gov.vn to learn about national digital transformation. Decree 137/2024/ND-CP guides the conversion of a number of state agency activities to the full electronic environment, focusing on four main activities including: providing online public services; internal administration; direction and operation; supervision, inspection and examination. Decision No. 206/QD-TTg of the Prime Minister: Approving the "Digital transformation program for the library sector to 2025, with a vision to 2030". These software always have connections to input data devices/output data rendering devices, digital data storage, and authorization to check/monitor/post-check scores, student information, lecturers, attendance, exam questions for each subject, graded by machine or hand-graded for essay tests, then teachers enter them into the system according to authorization, digital conversion using software on the web and on applications installed on computers, on mobile phones and tablets, the attendance is continuously updated and promptly reported to the training department, to the faculty's academic affairs specialist and the school's Board of Directors always monitors regularly and always has the right direction for the school's development in student management, limiting errors that academic affairs and lecturers often encounter when performing. Since 2011, information technology has been applied to the activities of the Library with ALIB management software. This software is widely used in university and college libraries. The book collection includes specialized books with more than 27,000 copies of books and documents processed according to the DDC classification framework, cataloged according to MARC 21 standards. 100% of books and documents are entered into the library management software to serve the study, research and teaching of students, staff and lecturers. Fully and synchronously deploy technical infrastructure, data, human resources, information technology, information security solutions, in line with the development of science and technology; ensure synchronous connection with digital infrastructure in the national digital transformation program to serve the socio-economic development goals of the province. - Ensure the ability to provide sources of documents and information to meet the needs of research, study, and application in life. Deploy solutions to ensure network safety and security; manage and monitor information security; secure data, ensure backup and recovery mechanisms for servers, workstations, and related terminals.

2. METHODS

Data collection method collects information on the use of software and electronic libraries in the teaching and research process at Tay Do University, collects and analyzes documents, reports, and research related to digital transformation in education, especially software applications and electronic libraries.

System design and construction method with database and data warehouse design from building databases and data warehouses to store and manage learning and research information. Application software development with design and development of application software to support teaching and research, including data analysis tools and learning management systems.

Electronic library development from building and developing electronic libraries with functions of managing, exploiting and serving learning resources, supporting links with local educational institutions and libraries.

3. RESULTS AND EVALUATION

3.1. Using software in student management

Raising awareness of the political system and the whole society about the Digital Transformation Program of the library sector is one of the important contents in the cause of developing culture and education of the country. Use software in student management to enter midterm and final grades, view timetables and take attendance for each teaching session. Digital transformation helps create a learning environment where everything is connected to each other: computers, mobile phones, IP cameras, webcams, headphones. The new combination of technology, security, online monitoring aims to narrow the geographical distance to create a learning experience, while enhancing the interaction/collaboration/cooperation of everyone. However, digital transformation in education also poses some challenges, including ensuring equitable access to technology, training and support for teachers and students/students/school administrators, and ensuring information security and confidentiality in the digital environment by decentralizing access and monitoring against negative impacts from hackers/crackers.

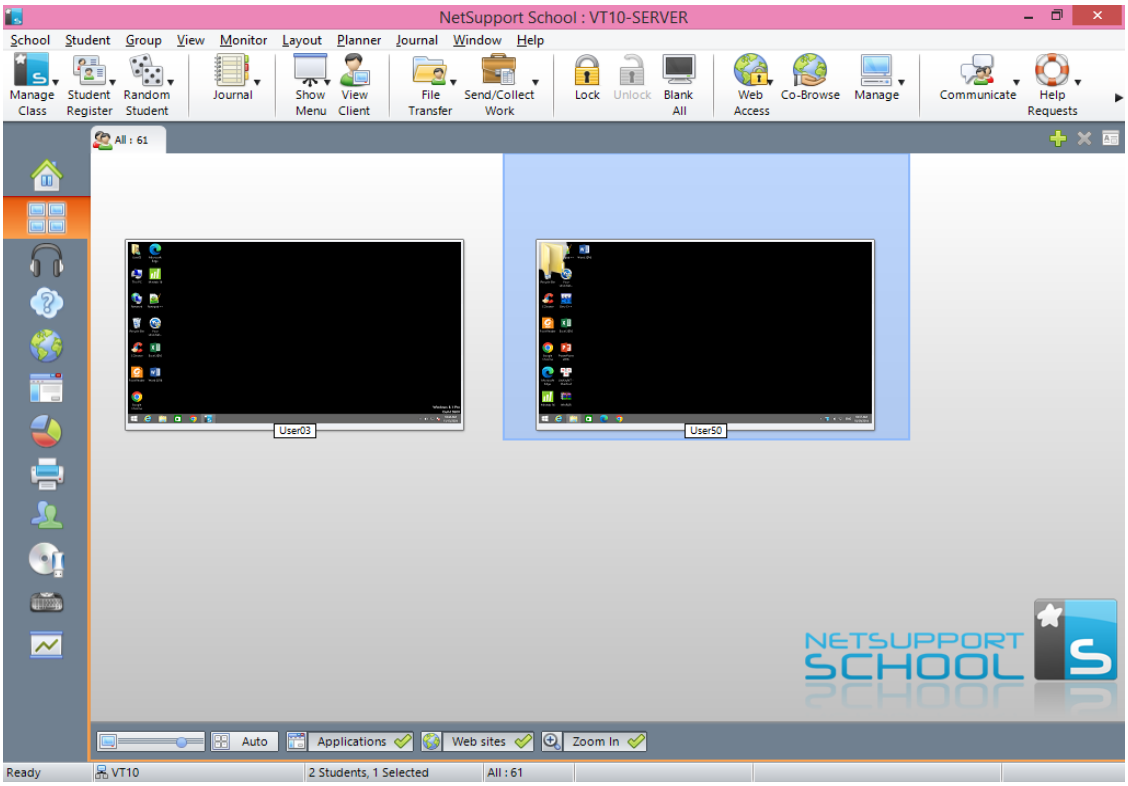


Figure 2: Use software NetSupport School at Computer Room VT10 - Tay Do University

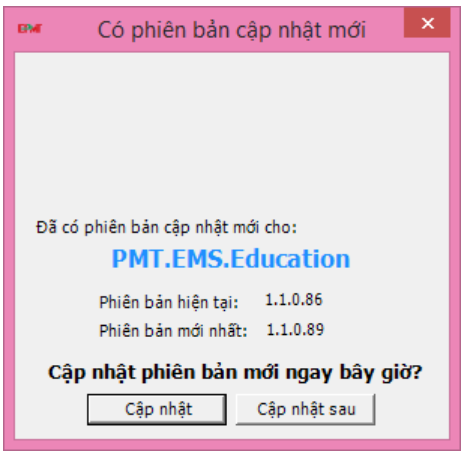


Figure 3: The software is continuously updated according to instructions from the circular of the Ministry of Education and Training and forms from Tay Do University where the author of the article is working.

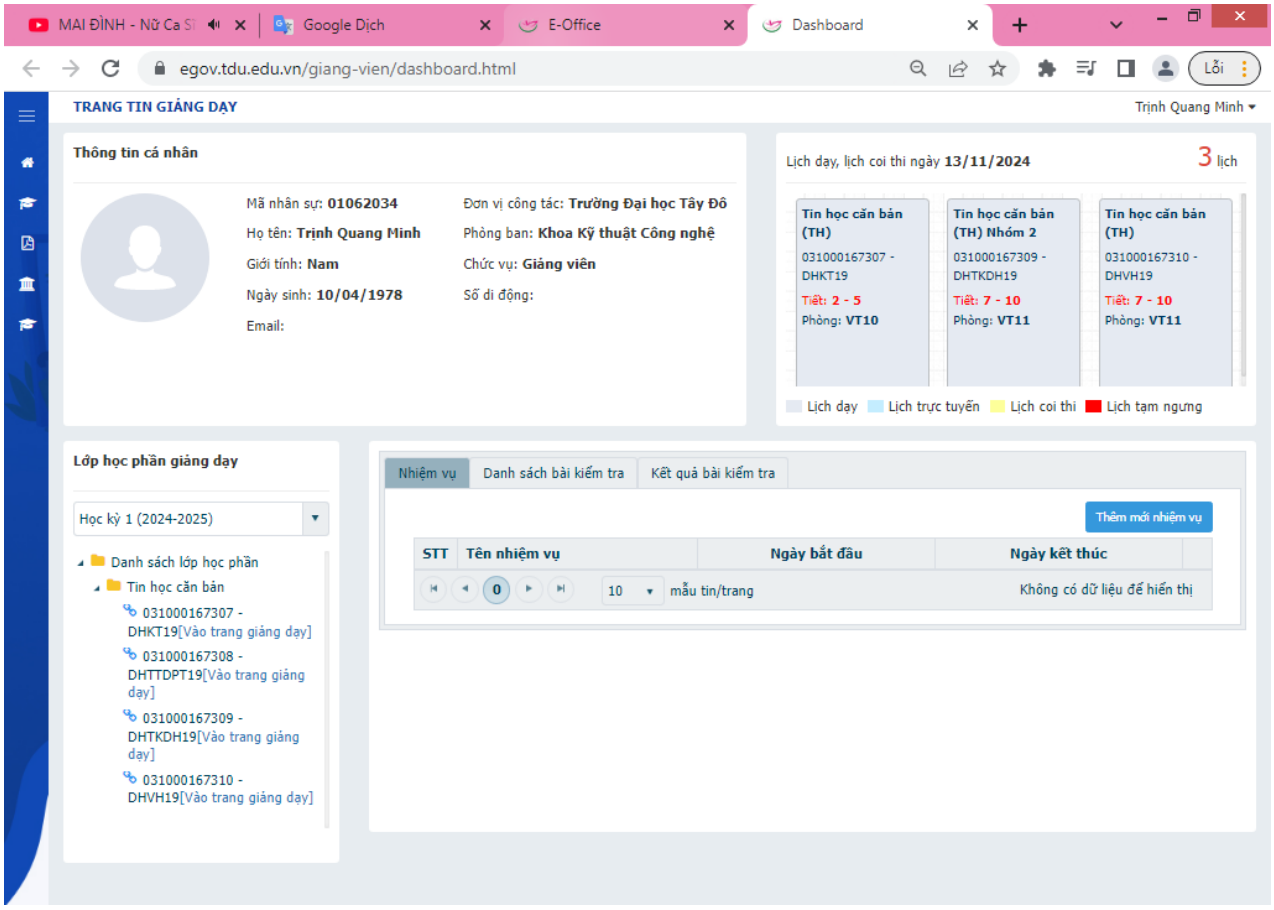


Figure 4: Department lecturer's teaching news page

Some examples of digital transformation in education in recent times:

– E-learning: Schools and educational institutions provide online courses through digital platforms and tools, allowing students to study anytime, anywhere. For example: Edumall, Moodle, Coursera, edX, Udemy.

– E-books: Replacing traditional textbooks with e-books, saving paper and easily updating content. Applications such as Kindle, iBooks, Google Play Books support reading e-books on mobile devices.

– Learning Management System (LMS): Learning management systems such as Moodle, Blackboard, Canvas support teachers to manage courses, evaluate and track student progress easily and effectively.

– Online collaboration tools: Use applications such as Google Classroom, Microsoft Teams, Zoom, Zalo for teachers

and students to interact and study together flexibly and effectively.

– Learning support applications: Learning support applications such as Quizlet, Duolingo, simulation software on mobile phones or computers help students practice skills and knowledge through interesting online exercises and activities.

– Artificial intelligence and machine learning in education: Use artificial intelligence and machine learning to analyze learning data, provide personalized suggestions, improve teaching quality and support students' learning process. Moodle online exam software shuffles exam questions, and grades multiple-choice tests by scanning student answer sheets with 2B pencils.

– Virtual reality and augmented reality: Applying virtual reality (VR) technology, 3D glasses, and augmented reality (AR) books and software to read those books into education, helping students experience a more vivid, interactive and realistic learning environment. (Example: 3D movie projector at CGV Vincom Xuan Khanh Can Tho).

– Academic advisor, Student management: need to pay attention to remind students to manage the student portal to respond promptly when there are discrepancies on the portal. Manage students' slow progress in each course, promptly warn students to pay their debts. • Lecturers: pay attention to the deadline for entering component scores/midterm scores when setting up the division of component scores, considering exam conditions. When entering component scores, pay attention to carefully checking the student list, note that students of major 2 who have graduated from major 1 are very likely to have their scores entered incorrectly (because the students are in the graduated status).

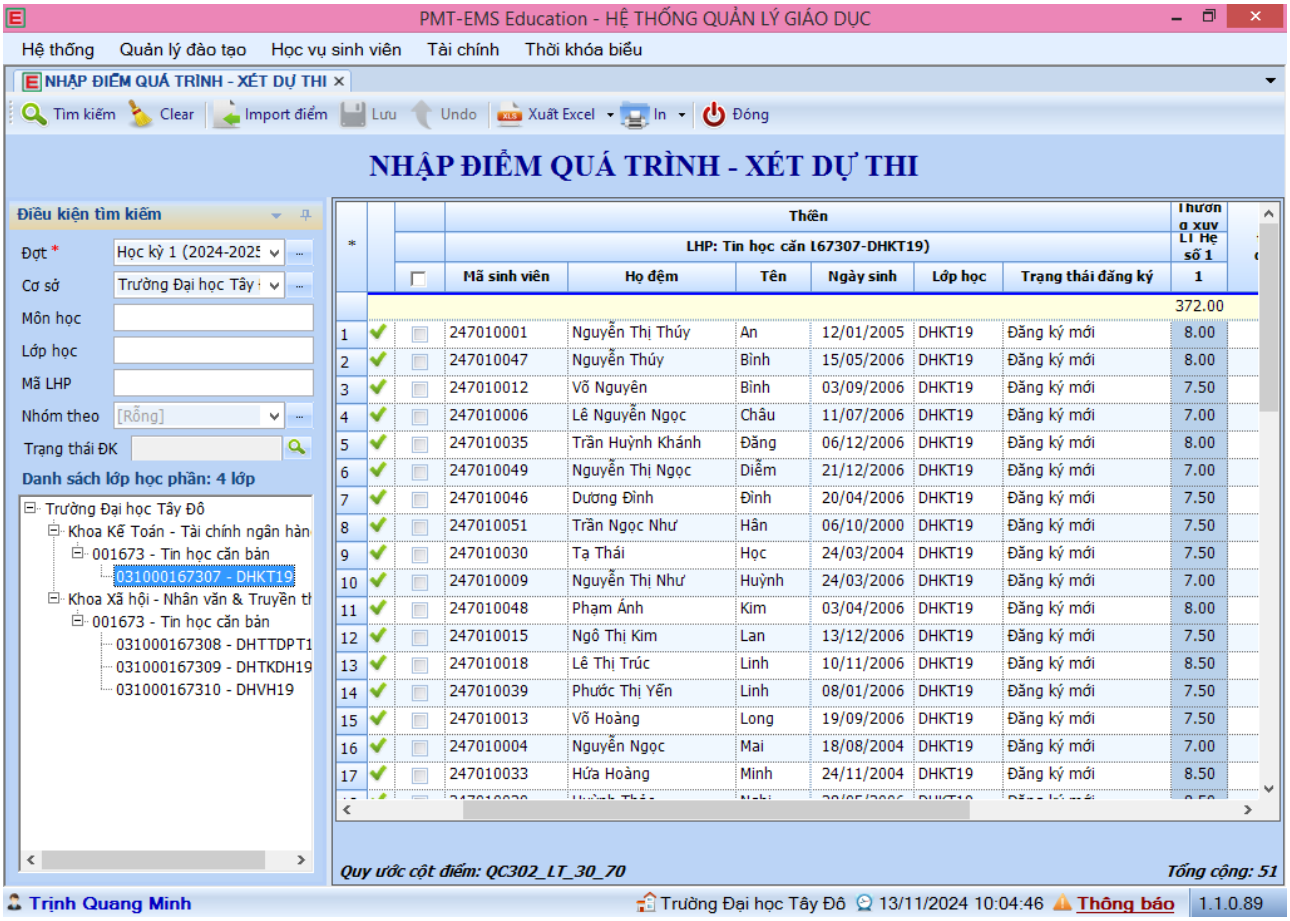


Figure 5: Enter the subject teacher's progress score for each subject.

The school is using the PMT – EMS software system, a comprehensive solution for managing universities, colleges and vocational schools. The score management section has training regulations, regulations on how to calculate subject scores, manage process scores - consider final exam conditions, organize centralized exams with marking, manage final scores, assign permissions to enter scores, print class transcripts, print student transcripts, student score/attendance logs. In the direction of upgrading the question bank management system (multiple choice and essay), test management and

exam organization. There are two forms of exams: paper exams or online exams. The question system is divided by chapter, knowledge group and level of each question. At Tay Do University, each subject, the lecturer will submit 300 multiple choice questions/subject to the testing center. The system supports online exams on the internet or in the unit's Lab and also moodle on the internal server. The system integrates with training software to check the validity of students' exams, such as whether they are banned from taking the exam (due to unpaid tuition, missed classes, etc.). The exam results will be automatically synchronized into the grading system of the courses or through the examination department, before announcing the results to students, depending on the management form of the school. Legal regulations on education have not been widely implemented, which is an issue that affects intellectual property rights and information security. Digital transformation in education is an opportunity to improve regulations on duration, testing methods, and recognition of online learning results.

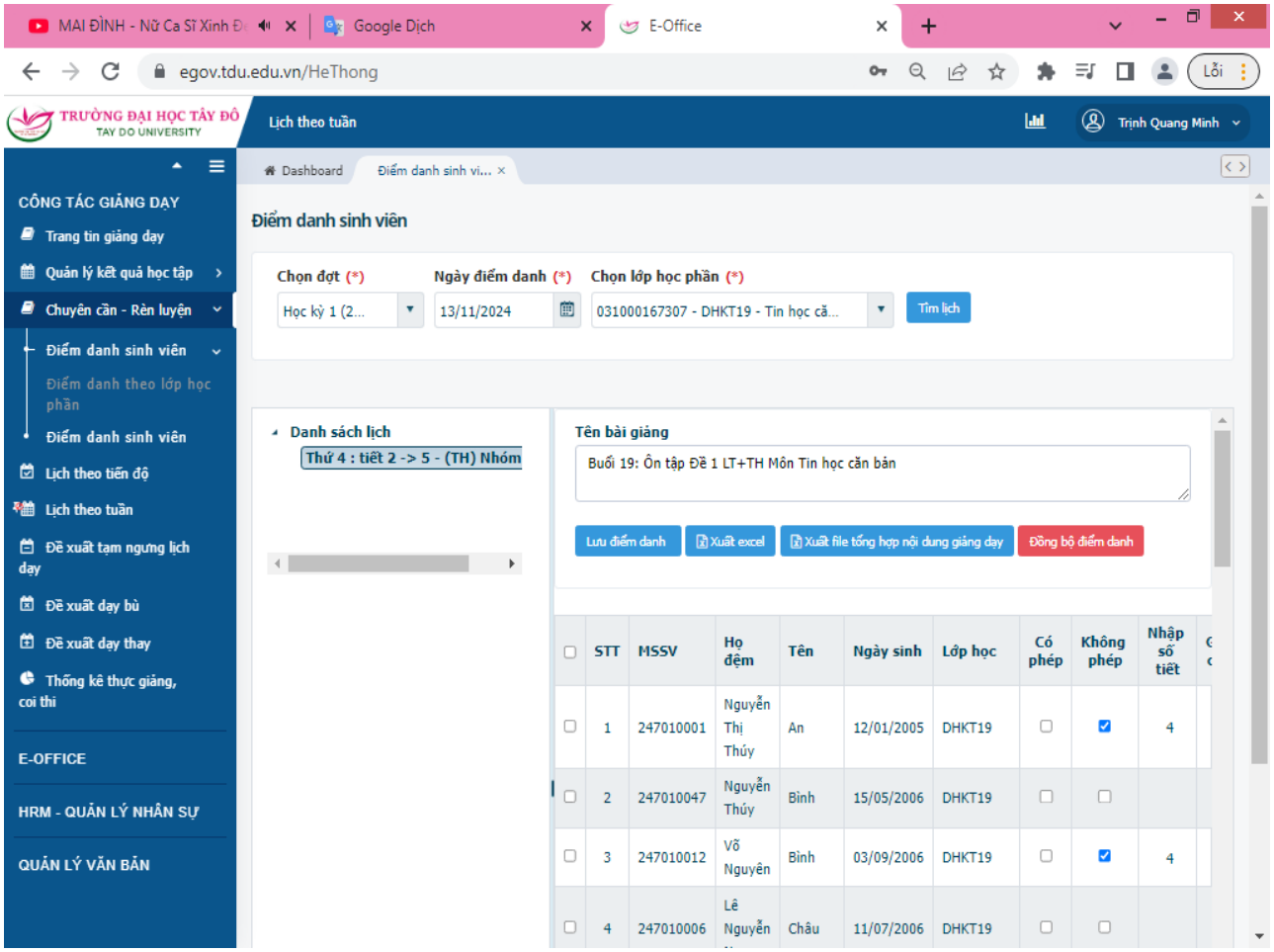


Figure 6: Attendance for each class is taken from the subject teacher for each subject with monitoring from the faculty and classroom management notebook.

Continue to strongly innovate teaching and learning methods in a modern direction, linking family traditions and local culture; promote the positivity, proactiveness, creativity and application of knowledge and skills of learners with a regional vision in regional linkage; overcome one-way imposition and mechanical memorization. Focus on teaching how to learn, how to think, encourage self-study, create a foundation for learners to update and renew knowledge, skills, and develop capacity. Shift from mainly learning in the classroom to organizing diverse learning forms, paying attention to social activities, extracurricular activities, and scientific research. Promote the application of information and communication technology in teaching and learning. Continue to innovate and standardize preschool education content, focusing on combining care and nurturing with education suitable for psychological and physiological characteristics, physical development requirements and personality formation.

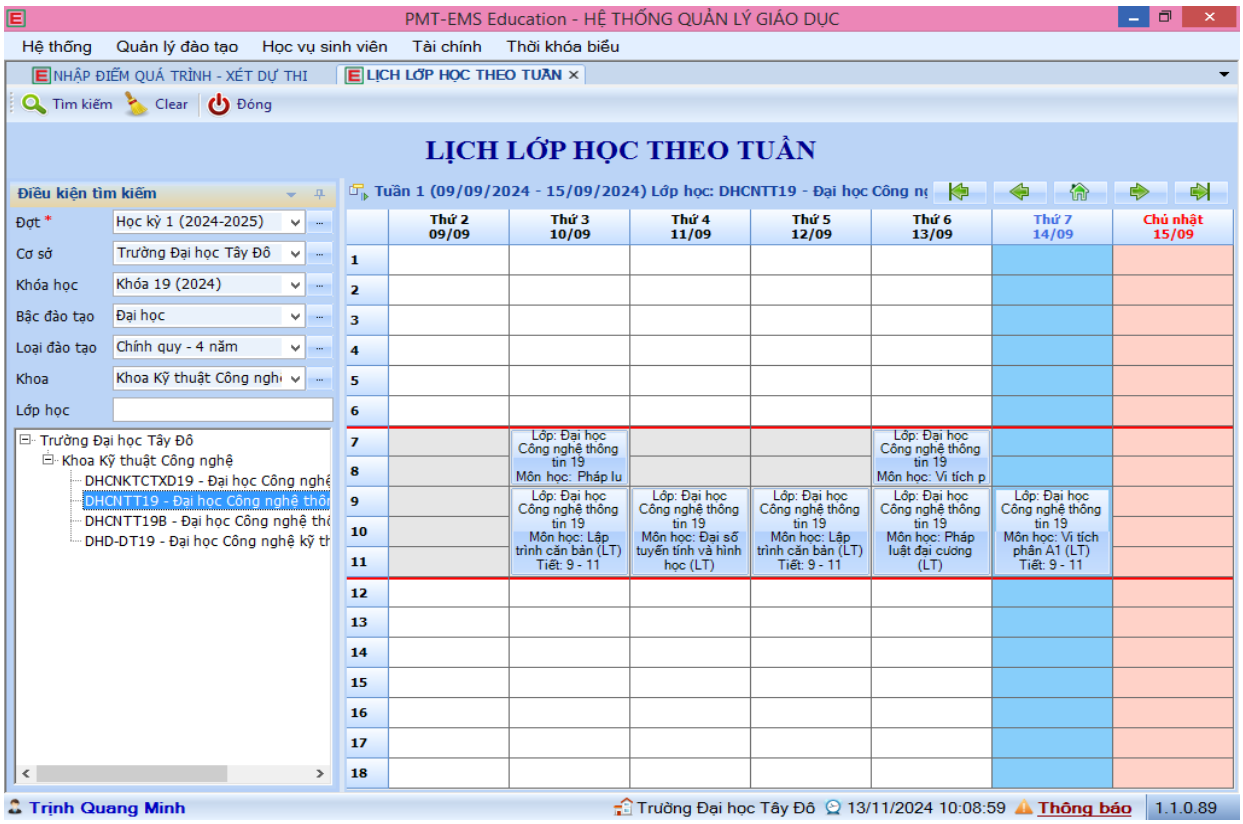


Figure 7: View the weekly schedule of a class (Example: Illustrative photo of IT University class 19A where the author is a consultant teacher)

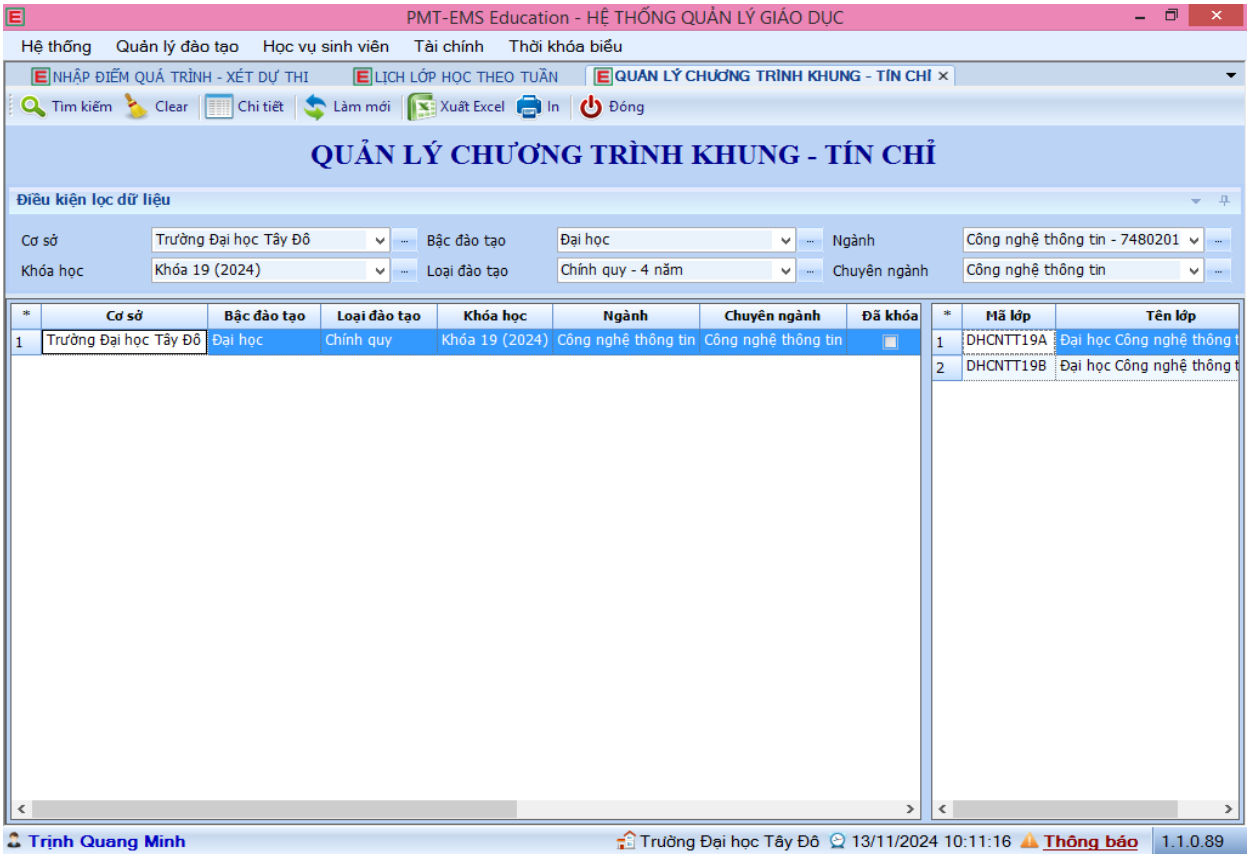
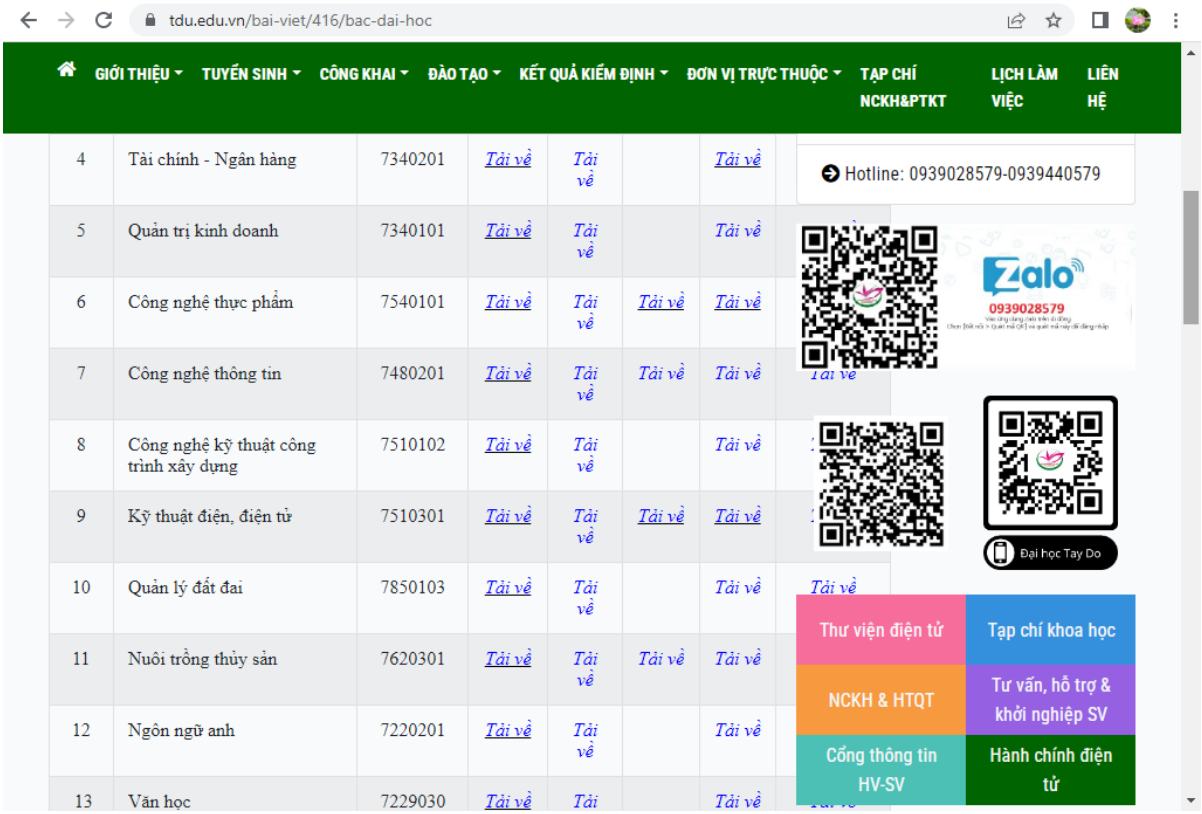


Figure 8: Framework program management - credits (requires authorized account to access updates)



4	Tài chính - Ngân hàng	7340201	Tải về	Tải về		Tải về	
5	Quản trị kinh doanh	7340101	Tải về	Tải về		Tải về	
6	Công nghệ thực phẩm	7540101	Tải về	Tải về	Tải về	Tải về	
7	Công nghệ thông tin	7480201	Tải về	Tải về	Tải về	Tải về	
8	Công nghệ kỹ thuật công trình xây dựng	7510102	Tải về	Tải về		Tải về	
9	Kỹ thuật điện, điện tử	7510301	Tải về	Tải về	Tải về	Tải về	
10	Quản lý đất đai	7850103	Tải về	Tải về		Tải về	Tải về
11	Nuôi trồng thủy sản	7620301	Tải về	Tải về	Tải về	Tải về	
12	Ngôn ngữ anh	7220201	Tải về	Tải về		Tải về	
13	Văn học	7229030	Tải về	Tải		Tải về	

Figure 9: Training program - University level pdf file for students to download.

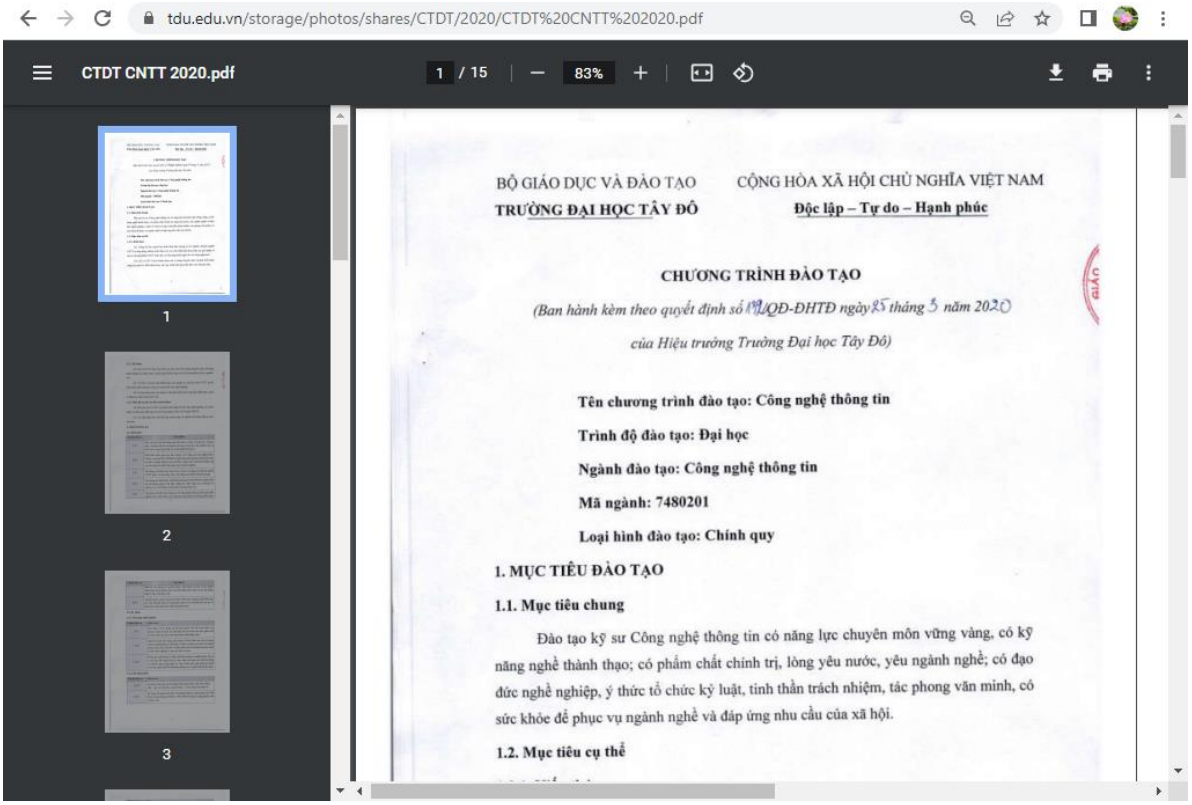


Figure 10: Information Technology University Training Program 2020 of Tay Do University.

2.2. Support education and training from virtual reality technology:

In education and training, it is necessary to increase the application of virtual reality technology to reduce costs and actual training time, for example, practicing flying an airplane in a realistic simulated cockpit.

Applying virtual reality (VR) technology in teaching activities, with stimulation technology, display, sensor, network, computer graphics and artificial functions to create simulations of interactive scenes of users in a virtual environment modeled after the real world through the user's vision, hearing, and tactile effects.

Augmented reality technology (AR) is developed on the VR technology platform, supporting additional interactive digital components. Therefore, we can activate the camera on the smartphone, view the real world around on the screen and interact with 3D objects, without requiring users to "immerse" completely in the digital world like VR.

Mixed reality (MR) technology is a technology that establishes a state of human perception of reality augmented with AR and computer-generated VR at different levels. The blending of VR and AR according to the formula MR=VR+AR aims to create a new environment in which physical objects and virtual objects coexist and interact with each other in real time.

Cross-connect virtual space technology XR (extended reality) or extended VR technology is the connection of all the above virtual technologies.

2.3. Electronic Science Database

Strengthening propaganda and dissemination of digital transformation in the library sector through mass media and other forms, integrating into related activities and events; focusing on praising and honoring cases that have achieved many positive results in digital transformation to spread and replicate. List of key tasks for implementing the digital transformation program in the library sector (2021 - 2025 period) (attached to Decision 206/QD-TTg dated February 11, 2021 of the Prime Minister) is to implement the centralized document digitization project such as national document digitization, document digitization of sectors and regions, national joint catalog project, joint catalog project of sectors and regions, building the project to build a database on Vietnamese libraries, plan to build national technical standards and regulations on libraries (focusing on library operation processes; library expertise; library interconnection; digitization of library documents), Program to improve the level of library resources (focusing on Modern library management, digital transformation level in libraries)

(Database Name: Subject Areas)

OPAC: OPAC = Online Public Access Catalogue: Online document directory database of the Learning Resource Center. This is a tool to support readers in searching for documents at the Learning Resource Center and the libraries of the faculties at CTU.

http://opac.lrc.ctu.edu.vn/opac/

Digital documents of CTU Learning Resource Center: The full-text dataset includes documents: good undergraduate theses, master's theses, specialized scientific journal articles, course materials, CTU textbooks, audio-visual materials, cultural films, scientific research reports of the Mekong Delta, etc.

https://digital.lrc.ctu.edu.vn/digital/

Digital Library - Cooperation between Learning Resource Center and tailieu.vn: Books, textbooks, reference materials http://lrc.tailieu.vn/

Vietnam Journal of Science Online – VJOL: VJOL currently provides over 23 Vietnamese scientific journals, over 91 Journal Tables of Contents, listing over 922 articles, of which over 517 articles are provided in full text in PDF format.. http://www.vjol.info

Vietnamese Law: Vietnamese legal documents from 1945 to present with a huge number of diverse and rich documents, meeting the needs of looking up information on documents and State policies of a large number of researchers, managers, businesses and individuals at home and abroad. www.luatvietnam.vn

Law Library: Providing more than 65,000 Vietnamese legal documents.

http://www.thuvienphapluat.com

Library Information Center – VNU Hanoi: The content of the documents covers all scientific fields that VNU researches and trains, especially documents of some key scientific fields.

http://www.lic.vnu.edu.vn

ProQuest Central (UK): The database provides in-depth documents in many fields and specialized journals with more than 100 topics.

http://dbonline.cesti.gov.vn/login?url=http://search.proquest.com/pqcentral/index?accountid=39958

SpringerLink: SpringerLink is one of the world's leading databases containing Springer publications. There are over 2,700 scientific and technological journals in the fields of Engineering, Chemistry, Materials Science, Computer Science, Medicine,...

http://dbonline.cesti.gov.vn/login?url=http://link.springer.com/

IEEE: IEEE (Institute of Electrical and Electronics Engineers) has over 158 academic journals, popular journals, professional documents, over 2,100 Conference Proceedings, data from other academic organizations, etc. IEEE topics: Electronics, Hardware, Software, Nanotechnology, Robotics, Semiconductor Devices, Telecommunications, Wireless Technology, Energy Engineering, Biometrics, Optics, Defense & Aerospace Research, etc.

http://dbonline.cesti.gov.vn/login?url=http://ieeexplore.ieee.org/Xplore/home.jsp

• Science Direct, Proquest, Springer Link, ISI Knowledge, Nature, IOP science, Scientific research reports,…: Portal of Vietnamese and English Databases of the National Agency for Science and Technology Information. ScienceDirect - published by Elsevier is one of the world's famous databases with high-quality scientific information sources. Science Direct's topics: Agricultural and biological sciences; Biochemistry, Genetics and molecular biology; Chemical engineering; Computer science; Energy; Engineering and technology; Environmental sciences; High-energy nuclear physics and astronomy; Materials science; General chemistry; Business economics; Management and accounting; Earth and planetary sciences; Immunology and microbiology. http://db.vista.gov.vn

AGORA (FAO - Food and Agriculture Organization of the United Nations):Agriculture, food, environmental science, and related social science fields. http://db.vista.gov.vn

HINARI (WHO - Tổ chức Y tế của Liên hợp quốc): HINARI (WHO - United Nations Health Organization) http://www.who.int/hinari/en

ARDI (WIPO- World Intellectual Property Organization): Research resources for development and innovation http://www.wipo.int/ardi/en/

Knowledgecenter:The subject areas of the journals include: Social Sciences, Natural Sciences, Languages… http://knowledgecenter.unr.edu/materials/articles/journals/free.aspx , http://wx2mz2qh4l.search.serialssolutions.com/?L=WX2MZ2QH4L

World Bank Open Data Repository:Research: World Development Indicators, economic development data, Global Development Finance income, Global Economic Monitor,…. http://data.worldbank.org

World Bank e-library:Rich documents on socio-economic development, especially e-books

www.worldbank.org/elibrary

Lyell Collection (UK): soil chemistry, http://www.lyellcollection.org/search.dtl

IngentaConnect:Public policy on Science, technology, appraisal of research projects. http://www.ingentaconnect.com/content/beech

IMF (International Monetary Fund):E-library: Contains statistical documents, e-books, reports, research, newsletters, etc. on Financial Crisis, Development, Macroeconomics, Poverty Reduction, Trade, etc. IMF data: Includes reporting data sources on Foreign Trade, Finance, Government Finance, International Reserves, E-library: http://www.elibrary.imf.org/ , IMF Data: http://elibrary-data.imf.org/

The electronic library is arranged together with a reading room with 100 computers connected to the internal network, internet and wifi and 300 seats. Since 2017, the Library has joined the Southern University Library Association; linked with the Learning Resource Center of Can Tho University, Da Nang University Library, Can Tho University of Technology and is continuing to link with other university libraries to create conditions for readers to have more resources to serve their learning, research and teaching needs.

The total number of current library resources is: 13,643 titles/29,945 copies. These resources include textbooks,

reference materials, reference books, projects, theses... of majors in the school's training sectors such as: Business Administration, Finance - Banking, Nursing, Pharmacy, Information Technology, Electrical - Electronics Engineering, Law, Land Management, Aquaculture, English Language, etc.

– Textbooks: 774 titles/774 copies;

– Reference materials: 10,751 titles/27,048 copies;

– Projects, theses: 1,529 titles/1,534 copies;

– Multimedia documents: 589 titles/589 CDs.

In addition, the library also has:

– 740 newspaper and magazine titles;

1,666 electronic documents have been built on the Dspace document site.

The entire library is covered by wifi and the computer system is connected to the network to support access to the electronic library, look up information from valuable electronic database packages such as: Digital Document Page of the Southern University Libraries Association, Digital Knowledge Connection Center - Digital Library for Universities; Digital Collection of Can Tho University Learning Resource Center; Phan Thiet University Library, Can Tho University of Technology Library,... open learning resources in the world: MIT OpenCoursewave, Coursera, FutureLearn, Hinari, Oare, Agora, Ardi, Eojnss…...

Average number of readers / year: 4,263 readers / year.

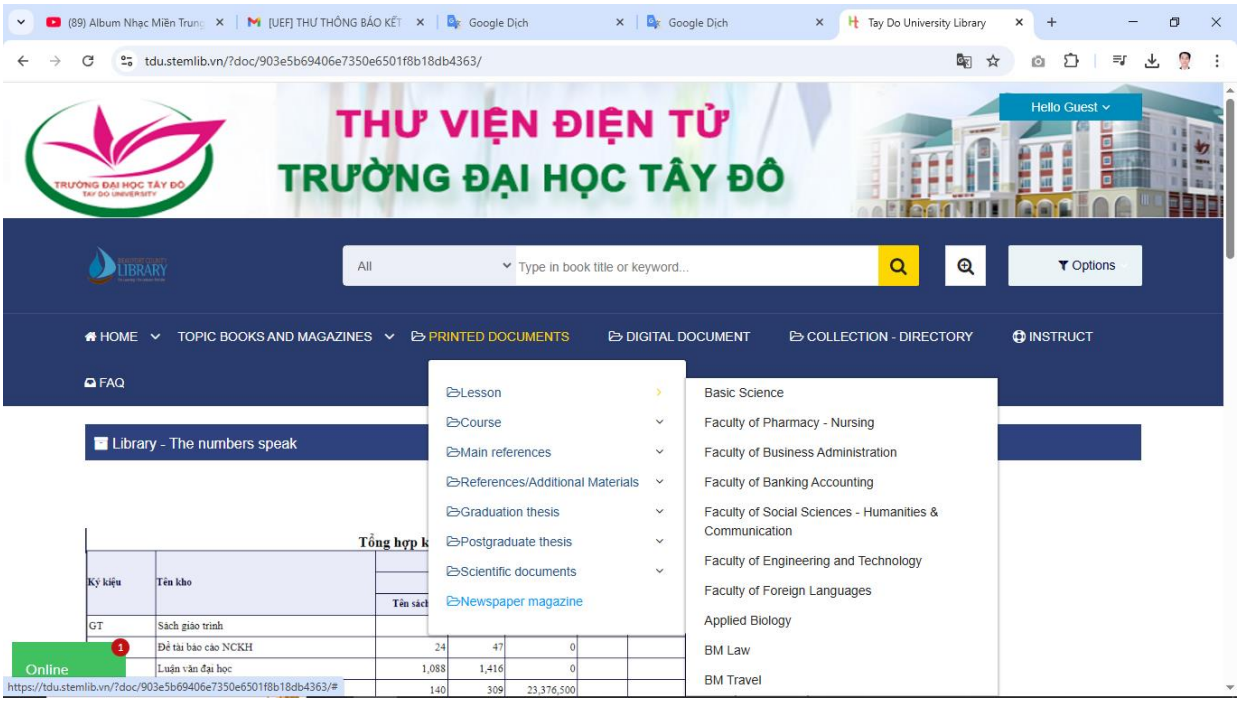


Figure 11. School Electronic Library Website https://tdu.stemlib.vn

2.4. Regulations on electronic transactions of state agencies and information systems serving electronic transactions

The Decree stipulates internal administration work in the electronic environment, including the main activities: Handling internal administrative procedures in the electronic environment for the following fields: Planning; strategy; human resources; finance - accounting; archives; assets; emulation - rewards; administration, synthesis and other fields as prescribed by law or by decision of the head of the agency. Implementing the information reporting regime in the electronic environment. Processing documents and work records in the electronic environment. Organizing work and remote meetings in the electronic environment. State agencies are responsible for reviewing and restructuring the process of internal administrative procedures in the above-mentioned fields, ensuring that the regulations are complete, clear, specific and reasonable, and that the basic components of administrative procedures are fully defined according to

regulations and meet the quality requirements as prescribed by the Government on implementing the entire administrative procedure process in the electronic environment. State agencies shall prioritize the processing of documents and work records in the entire electronic environment, except for documents and records containing state secrets; shall not simultaneously process documents and work records in the electronic environment and paper documents and records, except in cases where the law requires paper copies. Directing and operating in the electronic environment. The Decree clearly states: The head of a state agency shall be responsible for performing directing and operating activities in the electronic environment, based mainly on digital information and data; directing units and individuals under their management authority to perform advisory activities and process work in the entire electronic environment, except in cases where the law provides otherwise. Ministries, ministerial-level agencies, and provincial People's Committees shall develop and promulgate a set of indicators to serve the direction and operation in the electronic environment, ensuring that they are consistent with the needs, resources, and readiness level of the information system and database. At the same time, deploy the Information System serving the direction and administration at the ministerial and provincial levels to ensure the collection, creation, synthesis, analysis, processing, storage, connection, and sharing of information and data with the Information System serving the direction and administration of the Government and the Prime Minister according to the regulations and instructions of the Government Office; connect and share information and data with the information system serving the direction and administration of other ministries, branches, and provincial People's Committees when requested. Supervision and inspection in the electronic environment. Ministries, branches, and provincial People's Committees, according to their authority, are responsible for reviewing and simplifying the supervision and inspection process; developing supervision and inspection processes in the electronic environment; guiding and implementing supervision and inspection activities in the electronic environment in the fields and areas within the scope of assigned tasks and powers; Build digital platforms and technical tools to serve monitoring and inspection activities in the electronic environment within the scope of assigned tasks and powers. Organizations and individuals are responsible for complying with monitoring and inspection activities in the electronic environment of competent authorities.

3. CONCLUSION

Strongly shift the educational process from mainly equipping theoretical and practical knowledge to comprehensively developing learners' capacity and qualities with working skills according to social needs. Learning goes hand in hand with practice; theory is linked to practice; school education is combined with family education and social education. Develop academic resources and provide quality library services to support the teaching, learning and research processes of the University and the domestic and international university community. Digital transformation is the development of digital government - digital citizens, helping people to be better served, developing a digital economy to help people become richer and developing a digital society to help people become happier. Because when working with the support of IT, it will reduce repetitive costs and develop sustainably for the country. Digital transformation of the library industry based on the effective application and exploitation of digital technology, building modern libraries, digital libraries, developing information resources and digital resources, developing knowledge capital to contribute to improving people's knowledge and building a learning society. Focus on promoting the development of projects to digitize documents and resources, library information products on the basis of creating new ones and integrating with existing digital databases in an open direction in the forms of self-made, rented, purchased, linked, and exchanged; focusing on connecting open educational resources, including. The library databases provided to students are comprehensive online platforms, providing more access to millions of research documents in various fields. And in order to support teachers and students to effectively exploit technical resources from databases for scientific research, teaching and learning, the Learning Resource Center, the University and the Digital Library - Electronic Library jointly organized an introduction session on academic resources from the databases and the university's lecturers gradually updated scientific articles on orcid.org (For example: The author has also updated to https://orcid.org/0009-0000-5068-6774 although many international conferences have not yet had D.O.I, which is a limitation for scientific researchers).

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HOW MOBILE APPLICATIONS SHAPE JAPANESE LEARNING FOR STUDENTS AT HCMC UNIVERSITY OF ECONOMICS AND FINANCE

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ABSTRACT

The quantitative study attempts to localize to the Vietnamese setting the phenomenon that Japanese learning students at the tertiary education level can potentially reap benefits when exposed to Japanese language learning mobile apps. The study has one research question and a pool sample of 160 Vietnamese undergraduates of various majors who choose to learn Japanese as their second language; their Japanese proficiency is homogeneously in line with JLPT-5 and so shares a similar course across six classes. It adopts the experimental design and relies on the post-test as the research instrument, the scores of which are regarded as data to signify performance boost of said mobile apps. the subsequent analysis which pits ANOVA against the conventional p-value of 0.05 yields an accepted hypothesis and provides evidence of the phenomenon in the localized context of Vietnamese higher education. Overall, the study points out the novelty of the research and urges additional works to explore the subject further with it as the basis.

Keyword: "Foreign language learning", "Japanese", "mobile applications", "performance", "tertiary education".

1. INTRODUCTION

1.1. Problem statement

As a language representing one of the top four largest economies in the world in term of GDP scale (Kroese, 2024), Japanese boasts itself as a dominant force among the global soft power hegemonies, alongside English, Chinese, and German (Iwabuchi, 2016). While this means many foreigners will aspire to learn the language, and despite being a part of the Sinosphere linguistics family (Vovin, 2017), Japanese, however, still poses a serious problem to its potential learners, mostly due to the fact that it has two too many alphabets, i.e., besides hiragana, it also contains kanji and katakana. That is not to say, the fourth contender, its roman alphabet, called rōmaji, is having more of the "market share" of daily usage than previously mediated (Gottlieb, 2010).

In the face of such plights, it is too challenging for foreign language speakers to navigate their way around Japanese or, worse still, integrate in such a society where Japanese reigns supreme and that most natives are monolinguals (Turnbull, 2019). Absolutely no other language shares with Japanese its three alphabets. Even if they do, which is the case of Mandarin Chinese's either traditional or simplified, similarity between it and Kanji is nonexistent beyond the face value, i.e., the appearance of the words, since the meaning cannot be further apart. Once one gets past the alphabets, then the grammar can put a stop to many dreams as it does not follow the same sentence structure with English, i.e., SVO; rather, it somewhat resembles the Romance family of French, Italian, Spanish, Portuguese, and Romanian's SOV rule, where the verbs are put at the end whereas the adverbial phrases are not (Ma, 2020).

1.2. Research gap and question

To endorse the teaching and learning of Japanese in an increasingly globalized world, the Japanese government and private corporations have innovated countless methods to ease new learners into Japanese, one of which is the application of technology (Kubota, 2002). Technology, sufficient to say, is one of the most effective means the Japanese language education scheme has witnessed during the modern era, as it provides with not only the websites, the digital dictionaries and vocabulary trainers, but also the highly sought-after mobile applications that both resonate with GenZ and convenience the absorption of Japanese overall. Within this realm, the latter, i.e., mobile phone applications, experiences the most popularity that keeps rising, especially among university students in specific and young learners in general (Dong & Liu, 2013).

In the localized setting of Vietnam, thanks to encouragement policies from the Ministry of Education and Training, the foreign language teaching and learning scene has never bloomed to this scale before (Hoang, 2021). While the circular

is primarily intended at English, other languages are also given a fair share of attention due to the promulgation of a certified, standard conversion table where certificates achieved in those besides English are eligible for credit accumulation in accordance with the expected learning outcomes at the tertiary level as well as higher education. In this localized version, there are six levels of proficiency – harkening back to the CEFR – that apply to languages outside Europe, too.

Table 1. The conversion table for some foreign languages besides English in Vietnam (Hoang, 2021)

No.	Language	Certificate	Proficiency	
			Level 3 (B1 – intermediate)	Level 4 (B2 – upper-intermediate)
1	French	CIEP Alliance française diplomas	TCF: 300-399 DELF B1	TCF: 400-499 DELF B2
2	Japanese	TestDaF language certificate Goethe – Institut	TDN 3 Goethe-Zertifikat B1	TDN 4 Goethe-Zertifikat B2
3	Chinese (Mandarin)	Hanyu Shuiping Kaoshi (HSK)	HSK 3	HSK 4
4	German	Japanese Language Proficiency Test (JLPT)	N4	N3

Having the standard for foreign language learning is one thing, adopting the appropriate means to do so is another. Concerning Japanese learning in Vietnam, it has always been the most stagnant foreign language in Vietnam, relying heavily on only textbooks and tapes for additional listening occasionally (Nguyen, 2022; Cao, 2017; Sai, 2016). Thus, the task at hand is to find a way to break out of this stalemate – one that appeals to young learners, easy to promulgate, and can be applied instantaneously. Without a doubt, that would be the mobile applications oriented towards learning the language.

Then again, the issue has been raised, but there has not been many research into its effect in the Vietnamese setting. Even more so, at the tertiary level, virtually no prior research still relevant enough in the past decade acquiesces, acknowledges, or ascertains about such a special circumstance. Such is the research gap that this study manages to find and will fill in. The corresponding research question for this is as followed.

To what extent do Japanese learning mobile apps affect the students' performance?

The running hypothesis is that learning with the apps actually raise their Japanese test scores.

2. LITERATURE REVIEW

2.1. Supplementary resources in language learning

Not all resources must be pitted against one another for the leading position in a course syllabus. The curriculum can adopt the structure of a coursebook for de jure usage, but still allows teachers to implement other means of teaching to run along with it. Nguyen (2023) states that the internet is one big source of resources that are always available to assist students and teachers in learning a foreign language with little to no cost. Nguyen and Nguyen (2020) double down with this line of thought, citing that if the focus of the course is on the receptive skills, i.e., listening and reading, as well as the language areas of pronunciation, vocabulary, and grammar, then said resources are all the more effective. Thus, the use of mobile apps, which themselves derive from preceding websites – a product of the internet – undoubtedly shares in the same benefits. This means mobile apps aimed at learning Japanese are empirically bound to be highly effective and therefore no reasons should stand between its endorsement and the language classroom.

2.2. Learning Japanese with mobile apps

Towards the Japanese language learning endeavor, three popular apps and studies into them are named. This serves to adhere to the scope of this research and for better focus into the critical points of this peculiar language.

2.2.1. Wanikani

WaniKani is a highly structured, gamified learning platform designed to help learners master kanji and vocabulary in Japanese efficiently. It employs a Spaced Repetition System (SRS) to ensure optimal retention of information by reviewing items just as they are about to be forgotten. WaniKani introduces kanji through radicals, small components that make up characters, and combines these with creative mnemonics to help learners memorize meanings and readings. The program is organized into levels, gradually unlocking new kanji and vocabulary as previous lessons are mastered, offering a clear progression path. With over 2,000 kanji and 6,000 vocabulary words, WaniKani comprehensively covers JLPT levels N5 to N1. While it excels in recognition and comprehension, it does not include writing practice or grammar instruction, making it an excellent tool when combined with other resources for a balanced learning experience. The platform is available on the web, with mobile app support through third-party applications. Iwabuchi (2016) claim that the app is very applicable in the classroom under the guise of homework. After every session, the teacher can assign homework to students, requesting them to learn by heart the kanji letters they are taught via practicing using them in sentences and/ or writing them down using the various features in Wanikani.

Despite all the above, it does not however mean that Wanikani is without drawbacks. This app focuses almost exclusively on kanji and vocab, leaving out essential Japanese skills like grammar, listening, and speaking. This means learners will need to pair it with other resources for a well-rounded education – again, as aforementioned. Additionally, its teaching style relies heavily on what could be paraphrased as ‘learning by heart’; therefore, it may not suit everyone, as some might find it overly rigid or prefer different approaches. Lastly, being primarily web-based, it is less convenient for mobile users, and while third-party apps like Tsurukame offer mobile support, the experience may not feel as polished as a native app.

2.2.2. Kanji Study

Kanji Study is a versatile app designed for learners who want to master kanji through interactive and customizable tools. It features detailed information for each kanji, including stroke order animations, readings, meanings, and example sentences. The app also allows users to practice writing kanji directly on their device, making it ideal for honing handwriting skills. With features like JLPT-based categorization, customizable quizzes, and study lists, Kanji Study caters to learners at all levels. The app is highly praised for its intuitive design and focus on kanji mastery, though it does not offer grammar or conversational practice. An experiment has been launched to see how effective this app proves for students (Sumitra & Setiana, 2023). It shows that with Kanji Study equipped as a ‘sidearm’ running parallel with the coursebook, students have a higher score overall compared to those who only stick to the conventional hardback supplementary.

Kanji Study – while no doubt a sublime experience for those first dabbling in kanji – does retain certain oddities mostly due to its retrospective approach. It often provides minimal explanations or context for how kanji are used in real language, which can leave learners wanting more depth. Like WaniKani, it’s highly specialized, focusing solely on kanji and neglecting broader skills like grammar, vocabulary outside of kanji, listening, or speaking. As a result, users will need to supplement it with other tools to fully grasp Japanese, making it more of a niche resource than a standalone solution.

2.2.3. LingoDeer

LingoDeer is a language learning platform designed to help users learn languages in a structured and engaging way. It offers courses in a variety of languages, including popular ones like Spanish, French, and German, as well as East Asian languages like Japanese, Korean, and Chinese. The platform emphasizes grammar and vocabulary acquisition through interactive lessons, quizzes, and exercises. LingoDeer is particularly popular among beginners due to its clear explanations and step-by-step approach. With a focus on teaching reading, writing, speaking, and listening skills, LingoDeer combines a user-friendly interface with effective teaching methods to create an enjoyable and comprehensive learning experience. Dangubić and Srdanović (2021) survey 47 students learning Japanese at their university, ultimately finding out LingoDeer is the collective most favored app out of seven, citing its friendly UX/UI and a practical approach to Japanese alphabet retention rate.

Though learners will take to LingoDeer quicker than the two above as it is a ‘one-size-fits-all’ – incorporating teaching hiragana, katakana, kanji, and grammar in one package – it is not without downsides. Some learners find its

lesson progression confusing, as it occasionally introduces advanced concepts too early, which can feel overwhelming or disjointed. The app also suffers from technical issues, such as slow loading times and unpredictable audio playback, disrupting the flow of study. While its gamified design is engaging and fun, it might not provide the depth or seriousness that some dedicated learners seek, potentially making it better suited for casual study rather than intensive language mastery.

In synthesis, there are three apps and corresponding three studies about them, namely Wanikani, Kanji Study, and LingoDeer. The studies are survey- or experiment-based. Despite a diverse range of designs, they all reach a mutual conclusion that these apps deliver what they promise, i.e., they are highly effective in assisting learners of the Japanese language, but falter if treated as standalones in light of their many flaws and lack of language skills coverage, i.e., listening, reading, speaking, writing.

3. METHODOLOGY

3.1. Research design & instrument

As the research questions probed into the perception of the students and their performance after using the apps for a time period, this study adopted the experimental design to fulfill the objective. The corresponding instrument was a post-test for both the treatment and control groups for the experiment. This approach was deemed appropriate, as none other produced a more direct result than the post-test when performance was measured (Creswell, 2012).

3.2. Scope, research site, and sampling

The study was bound to the teaching and learning of the Japanese language scene by 160 freshmen of Ho Chi Minh City University of Economics and Finance, Vietnam. While the Japanese courses were offered by the Faculty of International Languages and Culture, the students in this study hailed from the various faculties of the university. Again, it must be stressed here that they did not study Japanese out of only preference, but there was also a sense of compulsoriness involved as Vietnamese students of any major that did not choose English as the foreign language to learn must learn to the intermediate proficiency another foreign language.

These 160 students came from all proficiency background in English, but shared the same Japanese proficiency of JLPT-5. They were randomly put into six classes of the same JLPT level which took place three times a week – either on Monday, Wednesday, and Friday, or Tuesday, Thursday, and Saturday. Since three classes were held by one of lecturer-researchers, he made sure to notify the students to download the apps at the beginning of the course and compelled them to rely on them during class time, at home for homework, and other assignments if necessary while the other three class under other lecturers were not exposed to this practice at all. At the university, a typical semester ran for 15 sessions, so aside from the first introductory session, a midterm one, and one for total revision before the final exam, there were 12 sessions remaining. Depending on which of the three treatment groups, the students were made to use one of three mobile apps for 12 sessions as an addon to their coursebook. Whether they continued using the apps past that timeframe was outside the scope of this study.

3.3. Data collection and analysis

Of the six classes, three under the lecturer-researcher with the tallied roster of 81 was chosen to be the treatment group, leaving the remaining half with 79 students the control group. Among the former, one was dedicated to using Wanikani, one committed to Kanji Study, and one devoted to LingoDeer. Once the post-test was administered, the analysis of variance (ANOVA) on the SPSS engine was applied to calculate the mean difference between the two groups and to find out whether the figures retrieved were statistically significant with an appropriate spread. ANOVA was favored over t-test due to the study having more than one treatment group (Emerson, 2017).

4. FINDINGS & DISCUSSION

4.1. Findings

With the administration of the midterm – post-test, the results of students from both the treatment and control group were also made apparent.

Table 2. The post-test results' means of the treatment and control groups

N	Group		Means
26	**Treatment**	Waninaki	7.92
28		Kanji Study	8.18
27		LingoDeer	7.98
79	**Control**		7.35

At first glance, the treatment group which deployed the three mobile apps to learn Japanese alongside the coursebook witnessed a significant rise over its control counterpart, the latter of which situated at only 7.35 in mean. Meanwhile, the group with Kanji Study topped the chart, going past the 8.00 threshold to reach 8.18. LingoDeer came second with a 0.06 mean difference with Wanikani, at 7.98 and 7.92 orderly. In terms of statistics, using the apps yielded superior scores to not using them at all. However, to deem the significance of said figures, ANOVA was put into the equation.

Table 3. Validity and reliability of the groups' means post-ANOVA

Category	Sum of squares	Degree of freedom	Mean square	F-value	Significance
Between groups	19.278	3	6.426	3.372	0.020
Within groups	297.270	156	1.906		
Total	316.548	159			

From the table above, the two most notable figures were the F-value and the significance rating. Assuming the p-value of 0.05 which was still larger than 0.020, then the data retrieved thus far in this study were considered statistically significant. Therefore, the null hypothesis that using the Japanese learning mobile apps as addons to the lessons did not raise the performance of students was rejected. Though they did increase the score, the F-value of $3.372 > 1.0$ reflected that the differences between group means are significantly greater than the variability within each group. However, it must be understood that the test was a multiple choice with 20 questions, each awarding 0.5 points, so the variation of variables could not be that diversified.

4.2. Discussion

Since the data was assessed to be statistically significant, several points could be made that not only attribute to this study, but also reinforce past researches into the matter. First of all, assuming the mobile apps under the guise of addons to the coursebook instead of replacing it altogether was a wise move. This was previously approved and implemented to great efficacy by Nguyen and Nguyen (2020), and Nguyen (2023). They agree with this study that if a full 'highjack' is enforced, a lot of paperwork would inevitably appear along with confusion that ultimately bogs down the progression of both parties – the teacher and the students.

On another hand, with the full acceptance of the hypothesis that warrants the apps help raise the students' performance, the study also proves the credibility of Wanikani's endorsement (Iwabuchi, 2016), Kanji Study's experiment (Sumitra & Setiana, 2023), and LingoDeer's perception survey (Dangubić and Srdanović, 2021) in one go. While it has not managed to gauge the attitude of the students who were administered the treatment of having assistance from Japanese learning mobile apps, it did reveal that LingoDeer was not just for show in terms of affection only; rather, the app boosts the students' performance really well, gaining a 0.63 point difference to the control group as previously displayed. Again, another experiment is performed on Kanji Study. True to the status of a top app for Japanese learners, it holds its weight well in the second bout, garnering the highest mean score compared to the control counterpart, at 0.83 point difference. In fact, among the three apps, Wanikani emerges as the least favored one. Even during the implementation, making sure students use it do to homework was really challenging on the lecturer's part. However, it still shows a marked increase in the midterm score, so in all sense and purpose, the app does its job. However, these merely elucidates that the young learners at the beginning level according to JLPT gain much fraction with the apps. Whether this effectiveness wanes or heightens for cases involving more advanced learners remains shrouded.

5. CONCLUSION

The study manages to put a foundation to the incorporation of language learning mobile apps in the Vietnamese teaching and learning scene in Vietnam, particularly the top three apps of Wanikani, Kanji Study, and LingoDeer. Though

the phenomenon is not groundbreaking, it serves to localize the research endeavor and successfully proves to an extent that, similar to the rest of the world, Vietnamese learners, especially at the tertiary level where this takes place, do and should benefit more from the practice. It is a testament for lecturers who have thought of the idea, but are still reluctant due to not being privy in technology or being afraid of the bureaucracy following after that they have nothing to fear and that there is no stopping them from doing what they think is best for their students and for the courses. What is more, while not original in design, this study is one of the very few that look into the relationship between technology utilization and the Japanese learning scene in the Vietnamese's classroom. What is more, it is conducted in English – the academic world's lingua franca – so its reach is not limited to only Vietnam. In brief, the study has the status of being the stepping stone for others to follow suit like none other as it thrives from the globalization that is happening in the research field.

As aforementioned, the implication of this study is not dissimilar to a limit breaker of sort for related personnel in the Japanese language teaching field. Obviously, many educators, teachers, and even administrators in this regard had touched upon the subject, yet they were reluctant, unsure of whether they should be making use of their newfound ideas as they might face the risk of getting disapproved or receiving too much negative backlash from the students involved. Even in the scenario that they pushed through past the conception, the dreary sense of uncertainty with neither the official support nor any academic foundation to boot could spell failure. All of these, however, only serve to enhance the timely arrival of this research. Not only does it bring forth a shield of insurance for the teachers in light of the fact that the use of mobile application does have positive effects on the students' performance, the study also reassures them to keep on exploring new alternatives beside the three apps in question. Another essential factor is that, since a localized study targeted at the Vietnamese students have been established, the teaching party and also the administrative ones should now have the means to develop a more integrated curriculum that awards innovation and creativity inside the Japanese language learning classroom. Teachers can be endorsed to think outside the box or make use of the technology more freely, e.g., they could build up a grading scheme based on the use of mobile applications, track the students' progress over the duration of the integrated course with reinforced scrutiny, or even incorporate the LMS platform – which have been the norm inside Vietnamese higher education scene for a while – to hand out assignments more effectively and officially.

Future research into this matter should build up on top of this research and – along the way – fills the gaps in its wake. The recommended courses of action are what this study lacks. First, this study's sample size is still quantitatively humble, so further investigation with an expanding scope on the population, the students' background information, e.g., socio-economic status, etc., and the varying proficiencies of the learners are good starts. Second, the experiment found here, though rigorous with three treatment groups, lacks a standardized pre-test and post-test that should resemble the JLPT as closely as possible. Third, the scope remains bound to HCMC University of Economics and Finance; should it be multiplied to other cases, the results will be much more valid and reliable. Fourth, additional research designs into this endeavor such as case study, survey, action research, etc., should be carried out to further the theory.

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EARLY PREDICTION OF STUDENT ENROLLMENT STATUS BASED ON THE DIVERGENCE BETWEEN DROPOUT AND GRADUATE PATTERNS

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ABSTRACT

Predicting student academic status is a crucial task in educational data mining, yet most studies primarily focus on binary classification between "Dropout" and "Graduate" often excluding the intermediate "Enrolled" status. This omission simplifies the problem but results in information loss, limiting the ability to assess student retention risks. In this study, we propose an enhanced (Farooq et al., 2024) predictive approach that retains and highlights the "Enrolled" category by incorporating 12 novel features derived from existing student records. These features capture academic consistency, enrollment stability, and behavioral patterns, providing a more comprehensive representation of student trajectories. We evaluate four models XGBoost, TabNet, Artificial Neural Networks (ANN), and Deep & Cross Network (DCN) and introduce Conditioned Probability Calibration, a novel probability adjustment technique that improves the reliability of "Enrolled" predictions. Experimental results show that our optimized DCN model achieves 91.2% accuracy, outperforming traditional baselines. Furthermore, removing stability-related features leads to a 5.3% drop in accuracy, highlighting their significance in classification performance. The proposed probability calibration method also enhances overall recall by 7.8%, mitigating bias in class predictions. These findings demonstrate the importance of preserving the "Enrolled Label" and leveraging feature engineering to refine predictive models in academic retention analysis.

Keywords: "Artificial intelligence", "Deep Learning", "Prediction Enrolled", "Smart System".

1. INTRODUCTION

In recent years, forecasting student academic outcomes has become a central focus for educational institutions (Dyulicheva, 2024), which aims to boost student retention and success rates. While many studies have concentrated on identifying students at risk of dropping out or those poised to graduate, the enrollment status (Enrolled) has frequently been neglected. This oversight is significant, as understanding and predicting the Enrolled status can offer early intervention opportunities to support students who might otherwise progress toward dropout or graduation without meeting their academic objectives. Unlike the dropout and graduate statuses, which signify definitive endpoints, enrollment reflects an ongoing academic journey. This dynamic nature renders it more challenging to predict due to the overlapping characteristics shared by both Dropout and Graduate students. Consequently, traditional predictive models struggle to accurately distinguish this category, underscoring the necessity for more sophisticated approaches. This paper seeks to fill this gap by developing an early prediction model that leverages the divergences between Dropout and Graduate patterns to enhance the identification of Enrolled students. By introducing novel features derived from comparative analyses of these two groups (Senevirathne & Dutta, 2024), our approach endeavors to improve predictive accuracy and provide actionable insights for academic advisors and policymakers.

2. RELATED WORK

Extensive research has been conducted on student dropout prediction, utilizing a wide range of models. Traditional methods such as logistic regression are widely used for their high interpretability and ability to identify key risk factors. This was demonstrated in prior work (Herzog, 2006), which reported reasonable predictive accuracy while highlighting key academic and demographic indicators related to student attrition. More recently, machine learning approaches like Random Forest and Support Vector Machines have shown superior performance in modeling nonlinear relationships and handling high-dimensional data. Notably, Marbouti et al. (2016) reported an accuracy of up to 93% in dropout prediction using Random Forest, demonstrating the model's robustness in identifying at-risk students. Recently, deep learning

architectures have further improved prediction accuracy by effectively modeling nuanced educational data patterns. Neural networks were applied to educational data (Mubarak et al., 2022), owing to their ability to capture subtle patterns in sequential academic behavior and student engagement. Similarly, predicting student graduation outcomes is well-documented. Longitudinal features—such as GPA trajectories, academic persistence, and course completion rates—have been emphasized as strong predictors (Guanin-Fajardo et al., 2024) Their XGBoost-based model achieved high AUC scores, demonstrating strong discriminative power between graduates and non-graduates.

However, despite the predictive success of these models, the existing literature overwhelmingly frames student status as a binary classification task—either predicting dropout or graduation. The intermediate category of students who remain "Enrolled" is largely overlooked. Very few studies explicitly predict ongoing enrollment; most include enrolled students indirectly within broader dropout or graduation models. This indirect treatment makes it challenging to distinguish the specific characteristics of continuously enrolled students, limiting targeted academic interventions. Furthermore, the absence of specialized features that differentiate "Enrolled" students from their Dropout or Graduate counterparts further undermines predictive effectiveness.

Our research explicitly addresses this research gap by specifically modeling the "Enrolled" status, thereby providing deeper insights into the unique academic trajectories of continuously enrolled students. This approach not only fills a critical gap in educational data mining literature but also offers practical tools for institutions to identify and support students who are at risk of prolonged enrollment without graduation (Koren & Peretz, 2024).

3. PROPOSED WORK

Most previous studies have focused on predicting student academic trajectories based primarily on two labels: “Dropout” and “Graduate”, while the “Enrolled” status is frequently omitted due to its overlapping characteristics with the other two labels. Although this omission simplifies the problem, it also results in the loss of critical information regarding student’s academic status, thereby limiting the ability to assess risks and personalize learning pathways (Mduma, 2023).

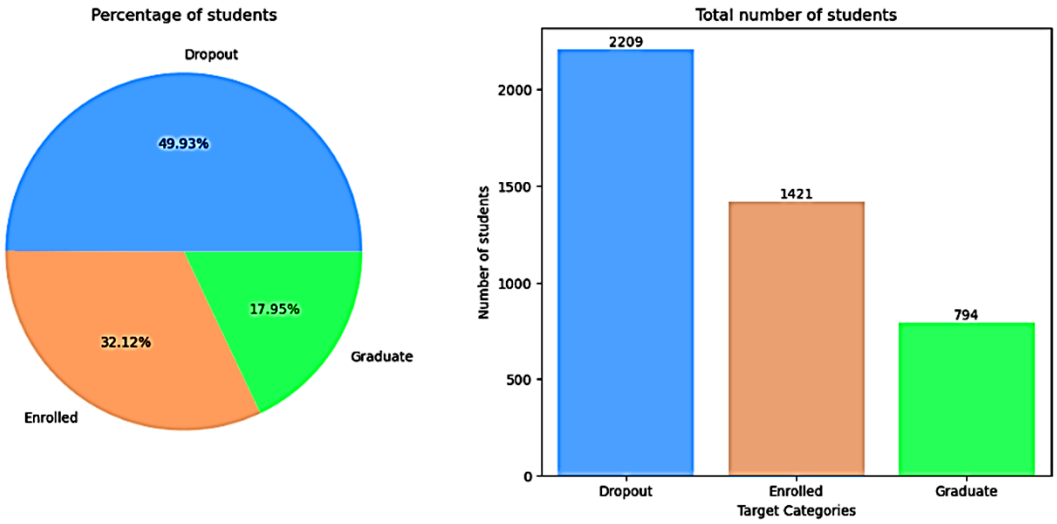


Fig 1. The proposed dataset is used for dropout prediction.

Through in-depth research and data analysis, we have identified a new approach in which the "Enrolled" label is not only retained but also plays a crucial role in determining student’s academic trends. Instead of using rigid classification methods as in previous studies, we apply a probabilistic prediction model to estimate the confidence level of each prediction (Kannan et al., 2023). This approach provides educational institutions with a more detailed view of students’ retention likelihood while creating a more accurate database to support timely intervention policies (Lacerda et al., 2023).

3.1. Feature Engineering

To highlight the "Enrolled" label, we construct 12 novel features, categorized into three main groups: (1) Learning behavior, including system access frequency and participation in academic activities; (2) Academic performance, such as GPA and the number of completed credits; and (3) Dropout risk indicators (Llauró et al., 2023), (Noviandy et al., 2024),

including enrollment stability and transition probability. These features help the model better distinguish among the three labels.

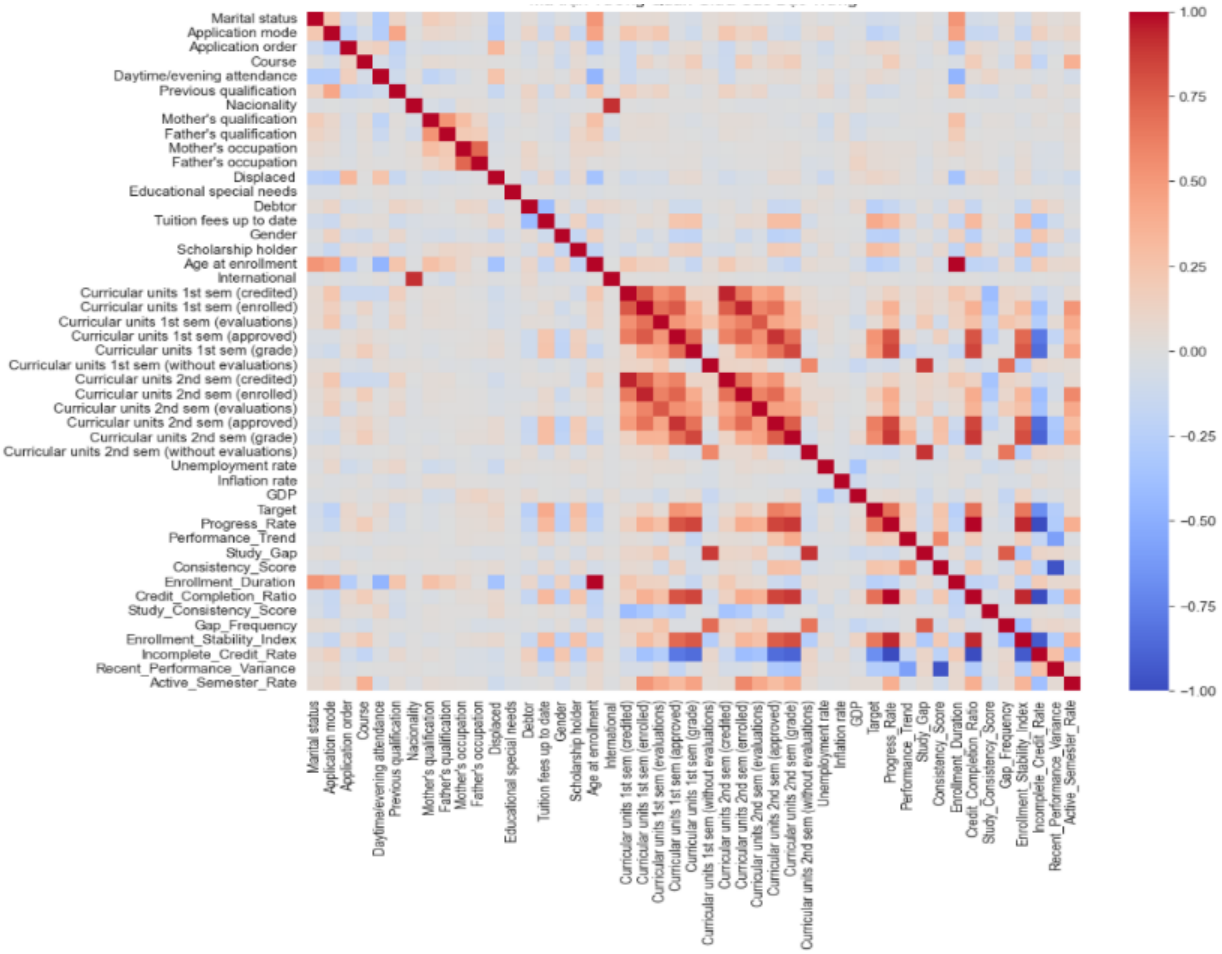


Fig 2. Illustration of correlated heatmap between features in the proposed dataset.

In this study, we employ four key predictive models: XGBoost, TabNet, Artificial Neural Networks (ANN), and Deep & Cross Network (DCN). These models are selected due to their effectiveness in handling tabular data and extracting information from the newly engineered features. XGBoost is used as a strong baseline, while TabNet and ANN leverage non-linear relationships in the data. DCN is employed to combine both linear and non-linear features, optimizing classification performance. The models are trained on multiple architectures with various methods. Experimental results show that this approach not only increases accuracy to 91% but also enhances the identification of the "Enrolled" group, achieving a recall of 0.85, thereby providing a more detailed perspective on students' learning behaviors.

3.2 Feature Description for Enrollment Prediction

To evaluate student enrollment status, we define multiple quantitative features that capture different aspects of academic progress, enrollment patterns, and commitment levels.

Progress Rate (Pprogress) measures a student's advancement toward graduation by calculating the ratio of completed credits to the total required credits.

$$\text{Pprogress} = \frac{\text{Ccompleted}}{\text{Crequired}} \tag{1}$$

Performance Trend (T performance) assesses the trajectory of a student's academic performance by analyzing GPA variations across semesters, using a linear regression slope.

$$\text{T}_{\text{performance}} = \frac{\text{sum}\big((\text{t}_\text{i} - \text{ bar t})(\text{GPA}_\text{i} - \text{ bar GPA})\big)}{\text{sum}((\text{t}_\text{i} - \text{ bar t})^2)} \tag{2}$$

Recent Performance Variance (V performance) quantifies fluctuations in a student's GPA over recent semesters to indicate stability in academic performance.

$$V_{performance} = \left(\frac{1}{N}\right) sum((GPA_i - \text{ bar GPA})^2) \quad (3)$$

Study Gap (Gstudy) captures the longest period a student has not enrolled in any courses, highlighting potential disengagement.

$$G_{study} = \max(t_{i+1} - t_i) \quad (4)$$

Enrollment Stability Index (Senroll) evaluates fluctuations in the number of enrolled credits between consecutive semesters, which can signal inconsistencies in academic commitment.

$$S_{enroll} = \frac{abs(C_{current} - C_{previous})}{C_{previous}} \quad (5)$$

Gap Frequency (Fgap) counts the number of semesters where a student had a break in enrollment, with a predefined threshold to determine significant gaps.

$$F_{gap} = sum_{i=1}^{N-1} 1(t_{i+1} - t_i > \text{ threshold}) \quad (6)$$

Enrollment Duration (Denroll) measures the total number of semesters the student remains actively enrolled, reflecting long-term engagement.

$$D_{enroll} = sum_{i=1}^{N} 1(status_i = \text{ Enrolled}) \quad (7)$$

Active Semester Rate (Ractive) calculates the proportion of semesters where a student actively enrolled in courses, providing insight into enrollment consistency.

$$R_{active} = \frac{N_{active}}{N_{total}} \quad (8)$$

Credit Completion Ratio (Rcredit) determines the percentage of enrolled credits that a student completes.

$$R_{credit} = \frac{C_{completed}}{C_{enrolled}} \quad (10)$$

Incomplete Credit Rate (Rincomplete) represents the proportion of credits that were dropped or not completed, derived as the complement of the credit completion ratio.

$$R_{incomplete} = 1 - R_{credit} \quad (11)$$

Study Consistency Score (Sconsistency) evaluates the stability of enrolled credits across semesters by measuring the variability in credit load relative to the maximum enrolled credits.

$$S_{consistency} = 1 - \left(\frac{sigma(C_{enrolled})}{\max(C_{enrolled})}\right) \quad (12)$$

Commitment Score (Cscore) quantifies the regularity of a student's enrolled credit load using the standard deviation-to-mean ratio, where lower values indicate greater consistency.

$$C_{score} = 1 - \left(\frac{sigma(C_{enrolled})}{mu(C_{enrolled})}\right) \quad (13)$$

These features collectively provide a comprehensive representation of student academic behavior, allowing predictive models to distinguish between students at risk of dropping out and those on track to graduate.

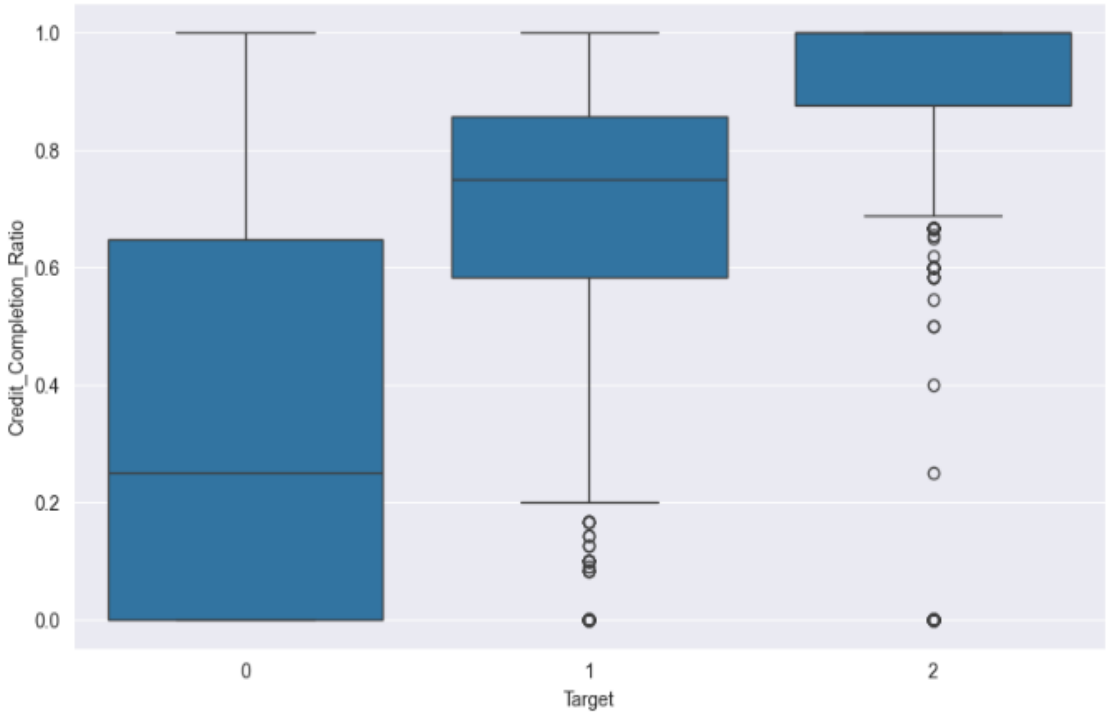


Fig 3. Visualization of Credit Completion Ration distribution based on target labels.

4. TRAINING & EVALUATION

In this study, we conducted rigorous model training and evaluation on an enhanced dataset from a Portuguese university (Realinho et al., 2022), emphasizing two innovations: probability calibration for the "Enrolled" group and optimized feature selection.

We performed model training and evaluation on the enhanced dataset, concentrating on two primary aspects: probability calibration to bolster the reliability of the "Enrolled" label and feature optimization to boost classification performance for that group. A notable challenge arose from the significant imbalance, with the "Enrolled" group comprising only 18% of the dataset, compared to Dropout (32%) and Graduate (50%), causing traditional models like XGBoost and ANN to exhibit low recall rates for the Enrolled category. Traditional models such as XGBoost and ANN tended to favor the other two labels, which resulted in a low recall for "Enrolled". This inherent imbalance made it particularly challenging to ensure consistent classification across all three groups, requiring an adaptive approach.

To effectively mitigate this imbalance, we developed a novel Conditioned Probability Calibration approach, carefully adjusting probabilities based on specific risk profiles derived from students' enrollment behaviors, outperforming conventional calibration methods such as Platt Scaling or Isotonic Regression. This approach adjusts probabilities based on various risk groups among the students while rebalancing the output probability distribution, thereby helping the model avoid biased predictions. A comparison between traditional calibration methods and our proposed conditional approach revealed that the recall for "Enrolled" increased by +7.8%, demonstrating its effectiveness. Specifically, the recall for the notably smaller "Enrolled" group (794 out of 4,424 samples) improved substantially, further validating the method's suitability in addressing the dataset's inherent imbalance.

Additionally, we systematically evaluated the impact of the 12 novel features introduced in this study, observing distinct sensitivities across different models. The analysis showed that XGBoost and TabNet were highly sensitive to features related to enrollment stability and GPA trends, whereas ANN and DCN were more effective at utilizing nonlinear features such as Study Gap and Enrollment Duration. Notably, when features associated with learning stability were removed, the accuracy for the "Enrolled" label dropped by -5.3%, underscoring their crucial role in identifying students and maintaining their enrollment status. Enrollment stability features were crucial in distinguishing continuously enrolled students, reinforcing their necessity in classification tasks.

Our experimental results validated the robustness and practical significance of our proposed methods, particularly

highlighting notable improvements in recall for the Enrolled category from the baseline of 0.77 to 0.85. The conditioned probability calibration method reduced misclassification rates and enhanced the model's capacity to identify students at risk of changing their enrollment status. These improvements not only increased classification accuracy but also offered deeper insights into the factors influencing students' learning behavior.

Model	Accuracy (%)	Precision	Recall	F1-score
XGBoost	77.1	0.75	0.74	0.745
TabNet	83.4	0.82	0.81	0.815
ANN	87.6	0.86	0.87	0.865
DCN	91.2	0.90	0.91	0.905

Table 1. Comparison of models based on classification metrics.

The outcomes clearly demonstrate that our tailored calibration and specialized feature engineering significantly enhanced the models' capability to classify student enrollment statuses accurately. Compared to traditional approaches, incorporating 12 new features and applying probability calibration enables the model to better distinguish among the three groups: Dropout, Enrolled, and Graduate. The tested models include XGBoost, TabNet, ANN, and DCN, each showing certain improvements when integrating the newly introduced features.

Among them, XGBoost achieved an accuracy of 77.1%, performing consistently but struggling with complex nonlinear relationships. TabNet, leveraging its attention mechanism, improved accuracy to 83.4%, though it still did not fully exploit feature interactions. ANN demonstrated better capability in capturing nonlinear relationships, reaching 87.6%, but exhibited stability issues when applied to the test set. Finally, DCN, combining feature crossing and deep learning, effectively captured both linear and nonlinear relationships in the data, achieving the best result with an accuracy of 91.2%. This confirms the critical role of feature optimization and probability calibration in improving classification performance for this problem.

5. CONCLUSION AND DISCUSSION

5.1. Results and Discussion

Our findings underscore the importance of explicitly modeling the "Enrolled" category as a separate class in student outcome prediction. By incorporating novel features particularly those capturing enrollment stability, GPA fluctuations, and study gaps, our method improves the model's ability to distinguish between Dropout, Enrolled, and Graduate statuses. The introduction of Conditioned Probability Calibration further enhanced prediction reliability for the underrepresented Enrolled group, raising its recall from 0.77 to 0.85 and reducing class bias in imbalanced data conditions.

The comparative evaluation revealed that while all tested models benefitted from our feature engineering, the Deep & Cross Network (DCN) consistently outperformed alternatives. Notably, omitting stability-related features resulted in a measurable performance decline, highlighting their critical role in characterizing students at risk of prolonged enrollment or attrition. Beyond improved metrics, our model offers practical value: it enables institutions to identify students in transitional academic states who may otherwise be overlooked, supporting more timely and personalized interventions (Guanin-Fajardo et al., 2024b).

5.2. Conclusion

In conclusion, our study addresses a notable gap in educational prediction research by treating the Enrolled status not as a transient byproduct but as a meaningful class. The proposed framework demonstrates strong performance in handling imbalanced student data and offers insights beyond binary classification models. While the approach achieves high accuracy, practical deployment will require addressing challenges such as computational efficiency and model generalizability. Future work will focus on evaluating this framework across diverse institutional datasets and exploring lightweight alternatives that retain accuracy while improving scalability and interpretability.

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SMART CLASS: A FRAMEWORK FOR STUDENT MONITORING AND ENGAGEMENT EVALUATION USING COMPUTER VISION AND BIO PRINT METHOD

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ABSTRACT

Evaluating classroom effectiveness through children's emotions is crucial for optimizing educational outcomes. This study introduces SmartClass, a multi-modal framework crafted for real-time assessment of student engagement and emotional responses within classrooms. Designed for children aged 5–12, SmartClass employs YOLOv11-Face for face detection, YOLOv11-Classify for emotion recognition, and ArcFace for identity verification, achieving an overall accuracy of 92.6%. The framework is underpinned by a curated dataset of 50,000 real-life classroom images, ensuring robust performance across diverse learning environments. To bolster security, SmartClass incorporates biometric authentication methods, including fingerprint scanning and NFC card identification—enabling precise student verification upon school entry. A multicamera setup ensures comprehensive emotion analysis, effectively mitigating challenges such as occlusions and misclassifications. By offering real-time analytics and actionable insights aligned with a positive emotion policy, SmartClass equips educators with an intelligent tool to refine teaching strategies, foster student engagement, and drive adaptive learning experiences. This work contributes to bridging critical gaps in educational technology, presenting a scalable and data-driven solution for modern classrooms.

Keywords:" Deep Learning", "Smart System", "Biometric Authentication", "Emotion Recognition", "Classroom Analytics"

1. INTRODUCTION

High-quality education is fundamental to children's development, particularly during middle childhood (ages 5–12), a critical period for emotional, social, and cognitive growth (Allen et al., 2013), (Pope et al., 2012). Emotional regulation and processing during this stage significantly impact academic performance, classroom behavior, and peer interactions, shaping long-term educational and personal outcomes (Loevaas et al., 2018). While a positive emotional climate fosters student engagement and achievement, challenges in emotion regulation can hinder learning, underscoring the importance of integrating emotional well-being into educational frameworks (Frenzel et al., 2021), (Braet et al., 2014).

Despite growing recognition of the role of emotions in classroom dynamics, existing research lacks comprehensive datasets and systems that analyze the interplay between emotional and academic factors in real-world educational settings (Veraksa et al., 2020). Many studies have examined classroom quality and emotional regulation separately, failing to provide an integrated perspective (Jones et al., 2014). Furthermore, current datasets often suffer from limited representation of middle childhood or employ oversimplified emotional metrics, reducing their applicability to educational contexts (Brown et al., 2024).

For example, datasets such as AffectNet and FER-2013 offer large-scale annotated facial emotion images but primarily focus on adult populations or restricted emotion categories, limiting their relevance to children's classroom environments (Mollahosseini et al., 2019), (Zahara et al., 2020). Similarly, studies like DEAP and GoEmotions provide valuable physiological and textual emotion recognition insights but lack contextual data from school settings (Koelstra et al., 2012), (De Silva et al., 2022). This gap is particularly critical for children aged 5–12, where a targeted dataset is necessary to capture the nuanced relationship between emotions and learning experiences (Verpaalen et al., 2019).

To address these limitations, this paper introduces SmartClass, a novel multimodal framework designed for evaluating classroom effectiveness, emotional dynamics, and identity recognition in children aged 5–12. The key

contributions of this work include:

– Development of the SmartClass dataset, comprising 50,000 images, to analyze emotional states and classroom interactions in children.

– Integration of YOLOv11 and ArcFace for face detection, emotion classification, and identity verification, achieving 92.6% accuracy.

– Implementation of biometric authentication methods, such as fingerprint scanning and NFC cards, to enhance student identification and security.

– Deployment of a multicamera system to improve emotion recognition accuracy by mitigating occlusions and misclassifications.

– Establishment of a classroom effectiveness policy framework based on emotional dynamics and student engagement analytics.

Through this research, SmartClass bridges the gap between emotional and academic evaluations, offering a scalable, data-driven solution for modern classrooms. By providing real-time insights, this framework empowers educators to refine teaching strategies, enhance student engagement, and foster an emotionally supportive learning environment.

2. RELATED WORKS

In recent years, the demand for datasets aimed at assessing classroom effectiveness, identity recognition, and emotional analysis especially for children aged 5–12 has surged. This rise is largely driven by advancements in deep neural networks, which excel at processing multimodal data from real-world educational environments (Mollahosseini et al., 2019), (Zahara et al., 2020). A key focus has been on "in-the-wild" datasets, which capture spontaneous classroom interactions, providing a foundation for bridging the gap between theoretical research and practical applications in education.

Emotion recognition datasets have been instrumental in advancing affective computing. The OMG Emotion Behavior dataset, for instance, captures spontaneous emotion expressions in real-world contexts, aligning with the need for authenticity in classroom-based emotion analysis. Meanwhile, physiological datasets such as DEAP (Koelstra et al., 2012) and SEED (Zheng & Lu, 2015) leverage EEG signals to analyze emotional states, showcasing the significance of multimodal approaches. While valuable for studying neurophysiological responses, these datasets offer limited applicability in classroom environments, where non-intrusive data collection methods are preferred.

For text-based emotion analysis, datasets like GoEmotions (comprising 58k annotated Reddit comments) provide granular emotional categorization, demonstrating the scalability of linguistic-based affect detection (Demszky et al., 2020). In contrast, FER-2013 (Zahara et al., 2020) and AffectNet (Mollahosseini et al., 2019) focus on facial emotion recognition through deep learning techniques, paving the way for real-time classroom emotion detection. AffectNet, in particular, is one of the largest datasets for valence-arousal computation, making it a key resource for facial expression analysis in natural settings.

Datasets specifically designed for child emotion recognition remain scarce. The Child Affective Facial Expression (CAFE) Set (LoBue & Thrasher, 2015) and KDEF-PT (Garrido & Prada, 2017) provide age-specific facial emotion data, addressing some of the unique challenges associated with recognizing emotions in younger populations. However, these datasets are often static and lack the dynamic, interaction-based data necessary for understanding emotional fluctuations in learning environments.

The application of emotion recognition in education has gained traction in recent years. Some studies have explored how affective computing can improve e-learning experiences by analyzing students' engagement and focus levels (Krithika L.B & Lakshmi Priya GG, 2016). Others have integrated AI driven monitoring systems to track student behavior and provide feedback, enabling adaptive teaching methods in real-time (Parambil et al., 2022). Additionally, deep learning models have been employed to assess student engagement and classroom interactions, offering insights into how emotional states influence learning outcomes (Li & Yao, 2023).

Several studies emphasize the importance of emotions in shaping classroom dynamics. Research such as Emotions Matter underscores how sentiment analysis can enhance student experiences by tailoring instruction to emotional

responses (Anwar et al., 2023). Similarly, approaches leveraging facial expression analysis have been used to adapt teaching strategies, demonstrating the practical applications of emotion recognition in classroom settings (Ramos et al., 2020), (Chu et al., 2018).

Despite these advances, a significant gap remains in the development of datasets and systems specifically designed for middle childhood (ages 5–12) a stage where emotional dynamics play a pivotal role in cognitive and social development. Many existing datasets prioritize adult populations or focus on non-educational settings, limiting their applicability to young learners in real-world classroom environments. Addressing this gap requires the creation of context-aware, multimodal datasets that accurately capture children's emotional states and interactions in natural learning conditions.

3. PROPOSED FRAMEWORK

3.1. Proposed Dataset

The dataset was gathered in a classroom environment utilizing two distinct seating configurations to guarantee varied data capture. The Straightlook Layout arranged desks in a U-shaped pattern, fostering interaction while providing an unobstructed camera view. In contrast, the Forward-Facing Layout positioned all tables toward the front, ensuring a uniform perspective for facial expression analysis.

A total of 1 hour and 15 minutes of classroom recordings were processed through three primary stages: video segmentation, face extraction, and data preprocessing. The recordings were divided into 0.2-second frames, and YOLOv11-Face was employed to extract and normalize faces to 160×160 pixels for standardized emotion and identity recognition. The dataset, hosted at SmartClass, was annotated with seven emotions—angry, disgusted, fear, happy, sad, surprise, and neutral using a two step labeling process that combined automatic classification via DeepFace with manual verification to ensure accuracy.

The final dataset comprises 50,000 images, augmented through techniques such as rotations, cropping, brightness/contrast adjustments, and the application of Gaussian noise, ensuring both robustness and real world adaptability. This dataset addresses a critical gap in classroom specific emotion recognition, thereby supporting advancements in AI-driven educational analysis. Additionally, it includes 100 biometric prints (fingerprints/NFC card data) from 100 different individuals, which enhances identity recognition and security applications. A multicamera setup was also integrated, offering comprehensive coverage and further improving the accuracy of facial expression and identity recognition. In summary, the final dataset fills an essential gap in classroom specific emotion recognition, paving the way for further advancements in AI-driven educational analysis.

3.2. SmartClass Framework

The SmartClass framework seamlessly integrates face detection, emotion classification, identity recognition, and classroom effectiveness evaluation into a unified system designed to analyze and enhance emotional dynamics in educational settings. Utilizing a multicamera setup, SmartClass ensures precise analysis by mitigating occlusions, motion variations, and other challenging classroom conditions. The system workflow is illustrated in Figure 1.

The process commences with face detection and tracking. YOLOv11-Face detects faces from multiple camera feeds, and overlapping detections are consolidated using a centroid-based algorithm to maintain a unique representation. Continuous tracking is achieved via the ByteTrack algorithm, ensuring robust performance even in scenarios involving occlusion or rapid movement.

Subsequently, emotion classification is performed using a model trained on the SmartClass dataset, which categorizes emotions into seven distinct states, when the classifier's confidence in a particular emotion reaches or exceeds ($\geq$ 70%), that emotion is considered the primary state for the subject (Zeng et al., 2009), (Gunes & Schuller, 2013). In other words, if one emotion accounts for over 70% of the classification output, it is deemed the dominant emotion, while predictions falling below this threshold are treated as ambiguous and thus discarded. This threshold-based strategy helps to ensure that only highly reliable predictions contribute to the final emotional assessment. Moreover, integrating data from multiple cameras further strengthens the reliability of the classification by reducing the impact of potential misclassifications from any single viewpoint.

For identity recognition, ArcFace ensures the accurate association of emotional states with individual identities throughout the session. Additionally, the dataset includes 100 biometric prints (fingerprint/NFC card data) from specific individuals, providing an extra layer of security when students enter the classroom.

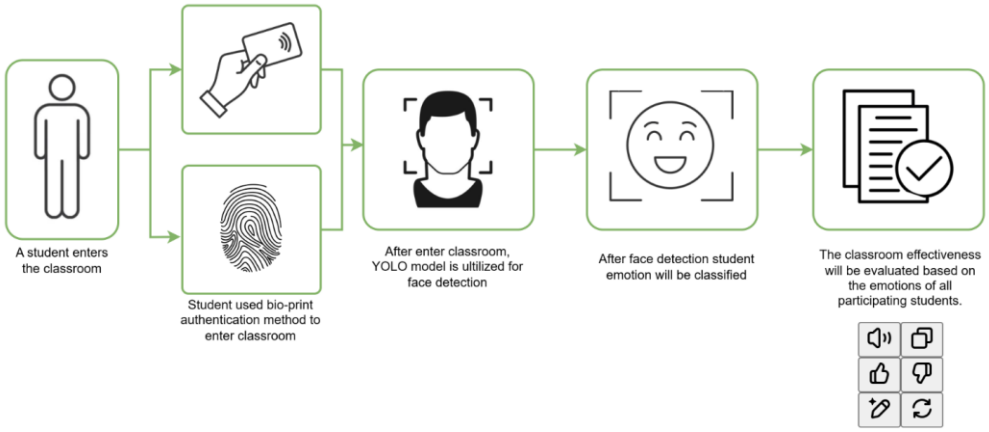


Fig 1. SmartClass Framework Workflow

The multicamera system comprises four strategically placed cameras positioned at the front, back, and sides of the classroom to offer a 360-degree view. This configuration significantly enhances facial recognition accuracy by capturing multiple perspectives, reducing occlusion, and filtering out low-confidence detections. Figure 2 illustrates this setup.

Lastly, the framework evaluates classroom effectiveness using a positive emotion policy. Sessions are considered effective if at least 70% of students display happy, surprise, or neutral emotions over a given period. This evaluation method aligns with research suggesting that a predominantly positive emotional climate is indicative of effective classroom engagement. For example, in (Calvo & D'Mello, 2010) discuss how real-time affect detection can be leveraged to inform pedagogical strategies by monitoring students' emotional states. In parallel, Fredrickson's broaden-and-build theory posits that positive emotions—such as happiness and surprise—expand cognitive and social resources, ultimately enhancing learning and classroom performance (Fredrickson, 2001). Although the specific threshold of 70% is a design parameter, it is conceptually supported by these findings, implying that when a substantial majority of students exhibit positive or neutral emotions, the session is likely fostering an effective learning environment. Furthermore, the system generates real-time analytics, including visual graphs that track positive emotions over time, enabling educators to optimize teaching strategies and enhance student engagement.

4. MODEL TRAINING AND FRAMEWORK PERFORMANCE

The SmartClass framework utilizes YOLOv11 for emotion classification, having been trained on the SmartClass dataset. It achieved an accuracy of 90.0% on the original dataset and 92.8% on the augmented dataset, outperforming both the Detection Transformer (DET) and ResNet50, as detailed in Table 1. The confusion matrix of all models are also illustrated in Figure 3 bellow, indicate their proficiency in emotion classification process.



Fig 2. Classroom setup for the multicamera method of the SmartClass framework. Four cameras are strategically placed around the classroom environment to capture students' emotions comprehensively.

Table 1. Emotion Accuracy Classification Results.

Model	YOLOv11	DETR	ResNet50
Original Dataset	0.910	0.741	0.700
Augmented Dataset	0.932	0.681	0.683

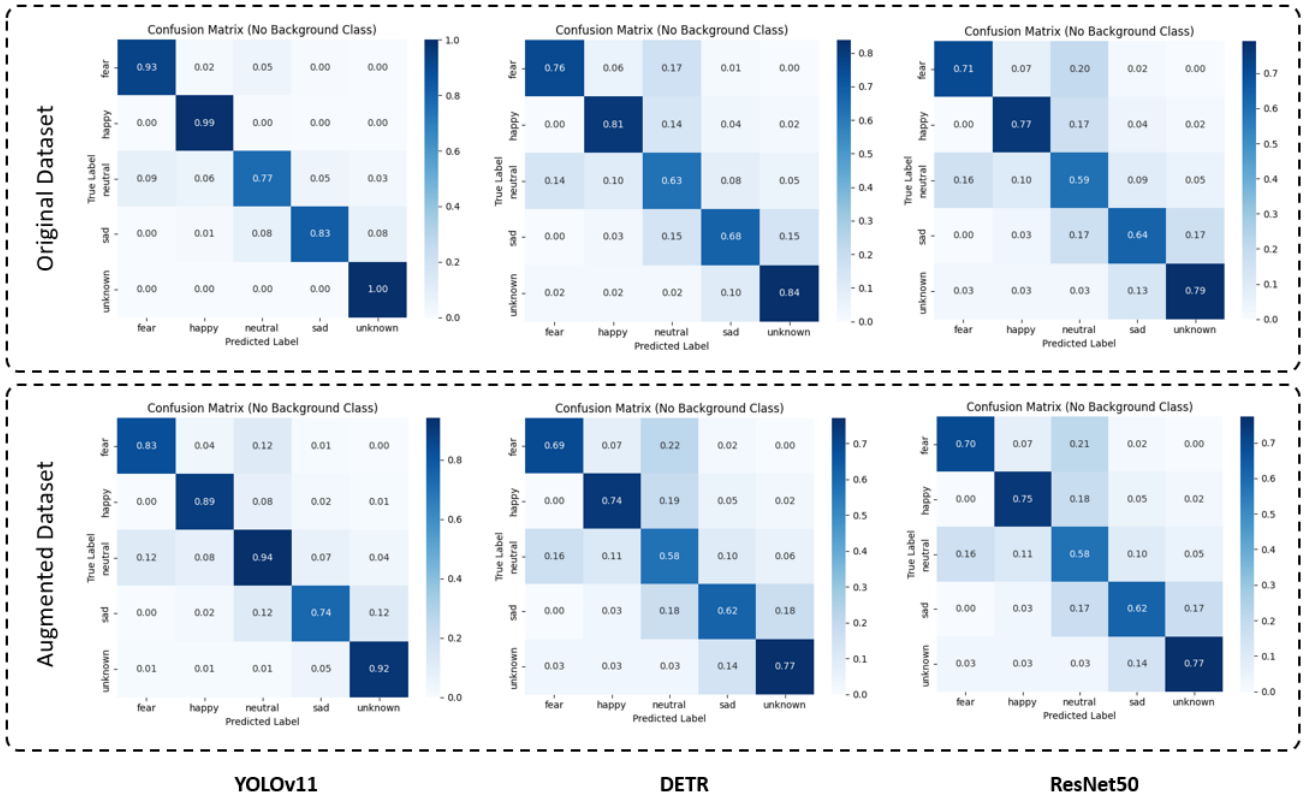


Fig 3. Confusion Matrices of YOLOv11, DETR, and ResNet50 on Original and Augmented Datasets.

Identity recognition is performed using ArcFace, which achieved an accuracy of 99.8% with Labeled Face In the Wild dataset (Huang et al., 2008), surpassing other models as shown in Table 2. Additionally, the system incorporates biometric prints from 100 individuals, attaining an accuracy of 98.6% and thereby enhancing identification reliability.

The system processes frames at 7.2 FPS with an average confidence score of 0.93, ensuring real-time operation. A video demonstration is available at this link.

Table 2. Identity and Biometric Recognition Accuracy.

Model	ArcFace	VGGFace	FaceNet	Biometric Recognition (Bio-Print)
Accuracy	0.998	0.9871	0.996	0.986

5. CONCLUSION AND DISCUSSION

5.1. Conclusion

This study successfully developed SmartClass, a scalable framework for analyzing classroom dynamics and recognizing emotions in children aged 5–12. By leveraging the SmartClass dataset and state of the art models YOLOv11-Face for face detection, YOLOv11-Classify for emotion recognition, and ArcFace for identity verification the system achieved an overall accuracy of 91.8%. The incorporation of a multicamera setup further enhanced reliability by mitigating occlusions and improving classification accuracy.

Beyond real-time analytics, SmartClass offers policy evaluation based on positive emotions, assisting educators in refining their teaching strategies. By addressing missing data and evaluating both verbal and non-verbal dynamics, the framework significantly advances educational technology.

5.2 Discussion

SmartClass demonstrates the transformative potential of AI in education. The high accuracy of YOLOv11

underscores the necessity for robust models in real-world classroom environments, while ArcFace's biometric tracking ensures dependable identity recognition even in dynamic settings.

However, challenges remain. Misclassification of similar emotional expressions such as disgust versus surprise—indicates a need for more advanced feature extraction and enriched training data. Moreover, although multicamera integration significantly improves accuracy, its adaptability to diverse cultural and environmental contexts requires further exploration.

Future work should focus on expanding the SmartClass dataset by incorporating regional, racial, and linguistic variations to enhance cross-cultural applicability. Additionally, integrating further modalities, such as audio analysis, could enrich classroom insights and support real-time feedback mechanisms.

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SUSTAINABLE DIGITAL TRANSFORMATION IN VIETNAMESE UNIVERSITIES EDUCATION: CURRENT STATE AND CHALLENGES

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ABSTRACT

There has been an increasing trend towards digital transformation in Vietnamese universities to approach a sustainable education scheme, particularly after the significant influence of COVID-19 pandemic. Digital tools application in higher institutions, such as artificial intelligent (AI) chatbots, encourages innovation to achieve sustainable objectives, thereby renovating methods in learning, teaching and researching initiatives. Vietnamese government has approved the Decision to promote technology in teaching and establish an education system being open as well as adaptable to various digital platforms. This paper aims to discuss relevant literature reviews regarding digital transformation types, suggested framework and provie an analysis about current situation of Vietnamese universities in sustainable digital transformation endeavors to identify major challenges and recommended solutions.

Keywords: "artificial intelligent", "digital transformation", "higher education", "sustainable development", "Vietnamese universities".

1. INTRODUCTION

The concept of digital transformation has been applied in various sectors with substaintal influences. With the role of providing knowledge in the era of vigorous innovation and development, digital transformation employment is the key step to approach and construct sustainable system in higher education. To be more specific, digital transformation has remarkable impacts on numerous aspects in higher education such as learning objectives, teaching and researching methods, educating formats, location, etc. As mentinoned by Kaputa et al. (2022), this revolution includes advancements of related infrastructure as well as the widespread practice of digital tools and technologies. In recent times, digital application can lead to productivity enhancement, revenue growth and reputation development (Matt et al., 2015). Consequently, a large number of higher education organizations have pursue digital transformations projects with specific goals to adapt to rapid alterations in digital age and remain their competitiveness. Although countless studies regarding the features, challenges, stakeholder's viewpoint, implementation of digital revolution has been published; there is a lack of the relevant topics for Vietnamese education institutes. Thereby, it is critical to carry out an analysis with regards to literature reviews and current situation of transforming digitalization for higher education in Vietnam with an aim to generate a more sustainable structure.

2. LITERATURE REVIEW

2.1. Concept of digital transformation

Digital transformation can be recognized by means of the changes derived from digital tools and technologies happen in organization. According to Young and Rogers (2019), this concept stems from ubiquitous data, connection, decisions that alter procedures, products as well as business structure.

In terms of higher education, Mohamed Hashim (2022) cited that the process of digital transformation is recognized as an approach to enhance students'experiences and educating materials, along with offering blended learning model.

In reality, during the period of worldwide pandemic, higher education institutions have widely applied digital platforms to maintain the continousness of learning process, with the great emergence of online education. The widespread of digital technologies also lead to the easier access to relevant data and online learning sources as well as the development of supported tools for digital application.

2.2. Digital transformation elements

2.2.1. Artificial Intelligence (AI)

Mohamed Hashim (2022) cited that AI is described by way of the recreation of human intelligence, tperformed by machines and computers. As mentioned by Nicola and Dalessio (2019), AI assists the personalized study to be appropriate with learners'requirements, the trending learning approaches worldwide recently.

The main purpose of adopting AI in education is sustaining the association between machine and human during studying process, particularly in the areas of using AI tools to improve the education quality overall (Rouse, 2019).

2.2.2. Internet of things (IoT)

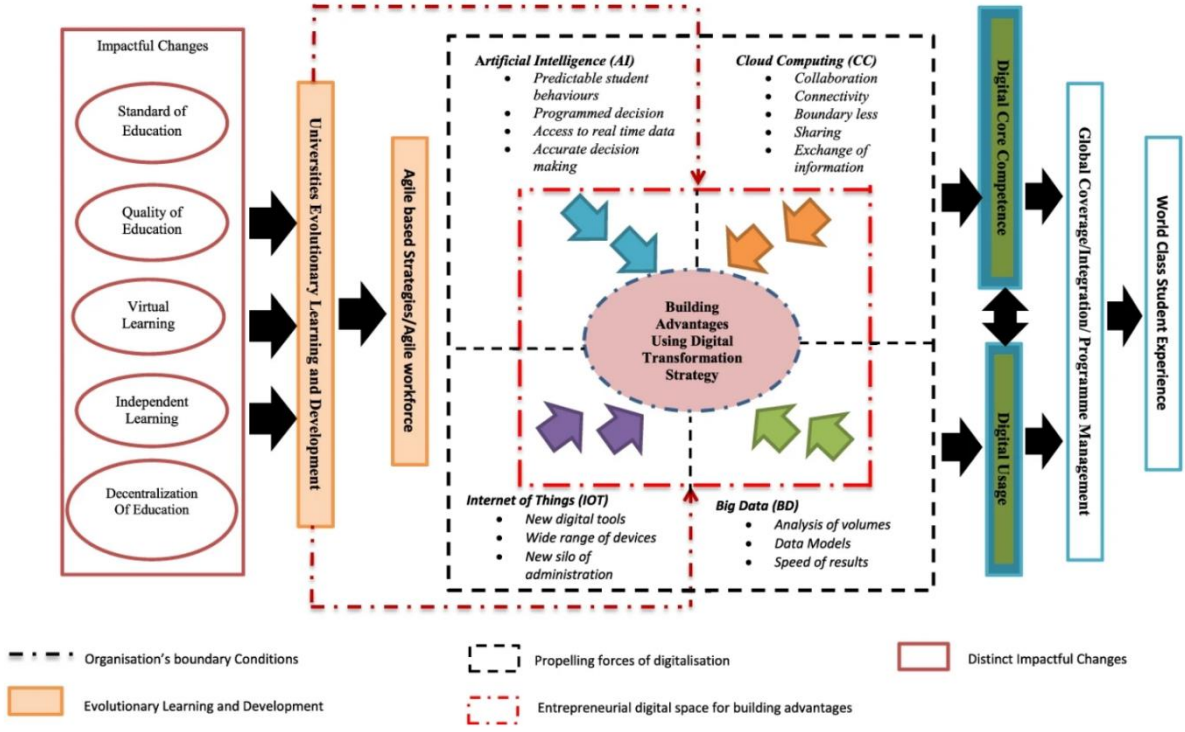
Internet of things permits the connection to computers and each other, which can produce benefits for human life (Furness, 2008). As cited by Gil et al. (2016), IoT supports the communication and correlation of devices to gain knowledge, information and save them for practice afterwards.

Indeed, with the development of digital devices, students tend to use laptops and tablet instead of books and papers throughout learning process. In other words, students are able to study by themselves with enough essential studying materials. In addition, Internet of things facilitates the educating procedure by providing technological tools to attain more efficient educational result.

2.2.3. Cloud computing (CC)

Cloud computing model allows computer resources to be employed, shared, constructed and retrieved through various networks and channels. Currently, Mohamed Hashim (2022) mentioned that cloud computer is extensively executed in colleges and universities to generate better learning experience, promote innovation, boost creative teaching methods, which ultilamtely resulted in superior educational transfer. The cloud computing is empowered by the utilization of the Internet or virtual reality technology.

2.2.4. Big data



Hình 1. Digital transformation strategy for higher education

Source: Hashim et al., 2021

Within the continously increasing challenges, higher education institutions have to seek solutions through the employment of data to make decisions. In fact, organizations can acquire date from various sources such as social media, digital libraries, online sources, etc., with exponential volume development but at cheaper price of storage (Daniel, 2017). In other words, big data enables the more effective analyzing and accessing procedures, ultimately leading to the wise evaluations and conclusions (Menon et al., 2014). As expressed by Dringus (2012), effective use of big data accommodates organizations to improve student's performance, reduce dropout proportion and create greater

understanding throughout learning process. Furthermore, big data is a evaluations and conclusions (Menon et al., 2014). As expressed by Dringus (2012), effective use of big data accommodates organizations to improve student's performance, reduce dropout proportion and create greater understanding throughout learning process. Furthermore, big data is a

2.3. Sustainable digital transformation in higher education

As mentioned by Foerster-Metz et al. (2018), digital transformation facilitates educational organizations in numerous aspects, with the purpose of gaining sustainable development. For higher education institutions, digital transformation allows them to implement innovative practices that improve leaners'experience and knowledge contribution, thereby cultivating the continuous enhancement progress. Virtual classroom, online platforms and to the sustainability by permitting individuals approaching a rich source of knowledge and skills. Moreover, digital transformation associates directly or indirectly with Sustainable Development Goals stated by United Nations. Specifically, Goal 4 regar dingQuality Education is supported by online learning programs and technological advancements. It is stated that organizations adopt digital technologies can achieve the abilities to generarte a more comprehensive, sustainable and forward-thinking mindset (Shahi & Sinha, 2021).

3. METHODS

The article concentrates on synthesizing and analyzing relevant information and data from various scientific research articles, journals and publications. By providing fundamental theoretical framwork related to digital transformation as well as eveluating the current state of digital transformation in education sector, the authors point out the challenges that higher education institutions encounter and proposes feasible solutions to solve them.

4. RESULT AND DISCUSSION

4.1. Current state of digital transformation in Vietnamese education

As stated by Statista (2025), Vietnam completes the top 13 with 77.93 million of its 97.47 million people accessing the Internet, equal to nearly 80%. For a variety of reasons, including interacting with others, working, studying, having fun, etc., using the Internet has become a daily habit for most Vietnamese people.

As per the Prime Minister's June 3, 2020, Decision No. 749/QD-TTg, approved the "National digital transformation program until 2025 and orientation to 2030." Vietnam's educational system aims to catch up with advanced digital programs. Actively engaging in and adjusting to the Fourth Industrial Revolution and the most recent developments in science and technology is one of the strategic development objectives.

The COVID-19 outbreak has produced a significant increase in online learning, which has altered the conventional way that education is delivered and aided in considerable advancements in training administration. To adapt to the pandemic, schools and students have been able to accustomed to online instruction (Vietnamplus, 2023). Due to the complex Covid-19 outbreak in Vietnam, almost 20 million pupils and around two million teachers at all levels were unable to attend classes in person. As a result, they were forced to use online learning tools like Zoom and Microsoft Teams. According to Rousse et al. (2021), this circumstance has had a substantial impact on the caliber of training programs, teaching and learning plans as well as school activities.

Additionally, prioritizing Etech development has been in line with sustainale development goals 4 (SDG4), which is stated United Nation. Vietnam has established a national education for sustainable development initiative for 2030 in order to carry out our promise at the 2021 UNESCO international conference. According to recent market research estimates from, the value of Vietnamese online education (EdTech) industry was above $1 billion USD in 2023 and is anticipated to increase at roughly 20% per year. It is forecasted that by 2025, the market size could reach 1.5 - 2 billion USD thanks to the growth in demand for online learning resolutions, strong investment from investors and the continuous development of digital and technology businesses in education. Therefore, the EdTech market is expected to reach a size of 1.5 to 2 billion USD by 2025. Vietnam now places in the top three most promising nations in Southeast Asia and top 10 fastest growing countries globally in EdTech, making up 20% of the region's overall EdTech market. In 2024, the average revenue per user (ARPU) is approximately 42.69 USD per person. It is anticipated that there will be 11.8 million users in 2029 (VOV, 2024).

In addition, Vietnamese digital technology enterprises have entered the digital education market with thousands of

products and services. Vietnam's "big techs" such as VNPT, MobiFone, Viettel, FPT, etc., have all deployed their own educational ecosystems with their own strengths. To be more specific, in case of VNPT (vnEdu), they provides a huge set of digital features to serve the administration, fee collection management, and effective learning for students with an online learning and testing system integrated with leading edge technologies and platforms such as Big Data, AR/VR, artificial intelligence, etc., helping to create stimulating learning and playing experiences, hence generating excitement and passion for learners. Indeed, 63 provinces and cities have adopted the vnEdu 4.0 Smart Education Ecosystem, which includes over 29,000 educational institutions, more than 800,000 teacher records, and over 8 million student records. For MobiFone (mobiEdu), it contains online teaching and school management solutions, distributes learning content to learners of all ages, provides an exam portal to assist learners test their abilities and review for important and prestigious domestic exams, etc., Regarding FPT (VioEdu), the platform provides online learning programs for 20 million users; Khaothi.online supports 700,000 people taking online exams/year. FPT AI Mentor helps to comprehensively evaluate 100% of the learning process, personalize training content, customize speed and learning content through analysis of learning ability. It is known that FPT is building a digital education assistant system specifically designed for each learner in a multi-platform, multimedia, multi-sensory manner...

4.2. Digital transformation challenges in Vietnamese higher education

First and foremost, the challenge stems from academics' reluctance to change, as digital necessitates that administrators and teachers adjust to updated technologies and instructional methodologies. People follow their habits, or the process that they have always accomplished their work. It might be difficult to persuade them to employ entirely different approaches to perform their tasks.

Additionally, digital transformation application requires complex procedures, massive investments, and considerable effort. Spending on education and training has only been between 15.7% and 19.1% over the last ten years, whereas the budget for education must guarantee at least 20% of the state budget (Ministry of Education and Training, 2023). As a result, funding for higher education remains extremely low and make the digital revolution becoming more challenging. According to Kaputa et al. (2022), changes with regards to digitalization entails the modernization of infrastructures as well as the growing usage of digital technology and media in numersous aspects such as administration, communication, learning, teaching, and research.

Furthermore, the differences in digital literacy between instructors and students during the implementing of digital transformation could be another concern, for instance, there is a disparity between students who live in remote areas and older teachers.

Shelton (2013) argues that academic discipline is associated only with certain challenges, particularly when teachers lack confidence in digital tools. About 20% of older adults felt confident and comfortable in learning and using online applications, while the rest said they face difficulties accepting and adapting to new technology. This puts older adults at risk of being left behind in catching up with digital technology platforms and applications, which can easily lead to losing the opportunity to connect with family and community. Information technology products are mostly designed for young users with quite complex software interfaces, small, difficult-to-read fonts, and touch device, thus it could be tough for elderly to use due to their physical condition.

Morever, the issue of information security when accessing modern systems has various potential risks of being hacked, for example, question banks, scams, malicious sites on the Internet negatively affect the mental health of students and teachers during the educating process.

4.3. Recommendations for Vietnamese universities

The process of digitalization in higher education organization is lengthy and requires the involvement of various stakeholders such as students, instructors, administrators, and the whole community. It means that cooperation among parties is essential for the effectiveness of utilizing digital applications.

Firstly, it is necessary for universities to set up rules and mechanism regarding using digital materials such as copyright, network security, legal compliance and other ethical features to create an appropriate and effective exploitation of digital resources.

Secondly, training courses need to be provided to improve digital skills for lecturers, administrators and students. Higher education institutions can establish specific requirements for all participants to ensure that they are able to use digital tools in the process of learning, teaching and researching.

Thirdly, universities should generate a flexible environment by supporting students learning through numerous digital channels such as online homework system, social media, online tests, etc. In simple term, sudents can access and acquire knowledge in a multidimentional approaches.

Fourthly, it is crucial to employ technological tools for efficient information management and storage. To increase productivity and facilitate student data access, system management software should be updated and implemented simultaneously. This procees assists universities forming a culture to make decision based on data-driven.

Fifthly, Vietnamese universities should pay attention to enhancing technological infrastructure. It means that investing in digital technology is a significant requirement, such as installing high speed fiber Internet connection, organizing simulation centers for role play activity and interaction, setting up professional studio to produce online learing sources, or establishing digital library where students can access to materials around the world, etc.

Sixly, a key component for institutions' sustained growth is human resources. In other words, creating a favorable environment and conditions to attract and maintain talents as well as experts in high tech industries, particularly artificial intelligence. With the high quality workforce, it would be easier for higher education organizations to be successful employing digital tools and technologies.

Finally, the Ministry of Education and Training have to continuously raise participants'awareness in higher education institutions regarding the critical role and early implementation of digital technologies to create an ecosystem meeting the need of learners in a digital world. Besides, it is important to call for funding from state budget and other communities to aid investment as well as sponsor in developing technological system.

5. CONCLUSION

This study summarizes related literature reviews with regards to digital transformation of higher education in Vietnam. To offering potential suggestions for Vietnamese universities and colleges, the article has discussed the definition, various forms of digital transformation, and some contemporary and upcoming difficulties. The paper recommends that additional research, including academic and empirical studies need to be carried out both qualitatively and quantitatively to examine the opportunities and challenges in implementing digital in higher education, to provide insightful viewpoint about this revolution. It should be noted that Ministry of Education, university administrators, and businesses must collaborate closely throughout the digital transformation process to generate a competitive edge that could support an effective and sustainable utilization of digital tools in Vietnamese higher education.

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BARRIERS TO TEACHERS' EXERCISE OF TEACHER AUTONOMY IN ENGLISH LANGUAGE TEACHING

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ABSTRACT

English language education is an essential key to successful communication, cultural exchange, and knowledge access in the increasingly globalized world. While learner autonomy is of enormous importance in one's language learning process, teacher autonomy is equally critical in ensuring effective teaching practices. In other words, teacher autonomy in shaping language education emerges as a significant factor influencing the quality and effectiveness of instruction. In particular, teachers need to adapt their teaching methods, assessment methods, program-building strategies, and appropriate teaching materials. These actions are associated with the concept of teacher autonomy. Therefore, in this paper, a theoretical analysis of the practice of teacher autonomy will be presented with a particular focus on the challenges that teachers face in English language teaching, including time, curriculum, teaching materials, and professional development opportunities. To address these challenges, several recommendations are offered, combining granting teachers' greater flexibility in curriculum design and material selection, enhancing institutional support for professional development, reducing bureaucratic constraints, and fostering teacher self-regulation and self-directed learning. Strengthening the teacher's autonomy would ultimately enhance the quality of English language education in Vietnam.

Keywords: "constraints", "English language teaching", "teacher autonomy"

1. INTRODUCTION

In recent years, autonomy has been one of the most extensive matters not only in education in general but also in English teaching as a second language in particular. Research on teacher autonomy emphasizes the concept's complexity, highlights how it shapes instructional strategies, adjusts to the requirements of different learners, and encourages innovation in the classroom (Borg, 2006; Murray, 2010). Different educational contexts have various levels of teacher autonomy, which are impacted by institutional rules, cultural norms, and the type of language program (Richardson, 1996). For instance, in Vietnam's centralized educational system, teacher autonomy remains limited due to various institutional constraints. Because Vietnam's education system has historically been highly centralized under the Ministry of Education and Training (MOET), curricula, textbooks, and exams are strictly controlled. Furthermore, because Vietnam is a socialist country, the system stresses standardization, which inhibits instructor flexibility. As a result, English language teachers frequently struggle to tailor lessons to meet the different requirements of their students. Teachers who lack the autonomy to modify their teaching strategies may negatively impact student engagement and learning outcomes. Although the strict structure of Vietnam's education system might limit teachers' options for creativity, innovation, and student-centered teaching approaches, reducing overall learning effectiveness, teacher autonomy is still restricted in the context of the Vietnamese nowadays. Therefore, only two recent studies have focused on teacher autonomy. For example, Tran & Moskovsky (2022) explored the degree of teacher autonomy at a Vietnamese university. Later, a study by Pham & Vuong (2023) investigated teacher autonomy at two Vietnamese universities. Besides that, a significant number of EFL teachers in Vietnam have little knowledge of autonomy, especially in their professional work. They frequently encounter various challenges, such as a lack of freedom in constructing lessons and having few authorities in choosing materials or teaching methods. These challenges include limitations in generating a curriculum, the inability to determine how to evaluate learners' outcomes, difficulties in implementing new methods or technology, and a limited budget for higher education that aims to enhance professionalism. Moreover, learners lack experience in self-directed studying, and they depend on the teacher too much. This implies a necessity for further studies to better explore teacher autonomy within the Vietnamese educational context. Therefore, this study explores teachers' challenges in practicing teacher autonomy in English as a foreign language by defining the concept of teacher autonomy

and its characteristics. This study provides implications for institutions and teachers that they might implement in their instructional practices.

2. TEACHER AUTONOMY IN ENGLISH LANGUAGE TEACHING

2.1. Definition of teacher autonomy

Teacher autonomy has been a prominent topic of debate among scholars in the realm of education, especially concerning language instruction. Autonomy, in this context, refers to the extent to which teachers have the freedom and independence to make decisions about their instructional practices, curriculum development, and assessment strategies (Benson, 2006; Farrell, 2016). In language education, teacher autonomy is accepted as necessary, affecting both their job's success and development in their careers, as well as the educational atmosphere and the results that students achieve. Cotterall (2000) and Tran & Duong (2020) assert that teacher autonomy was introduced to language teaching in the late 1960s. Nevertheless, research on teacher autonomy was not conducted as much as learner autonomy. Therefore, Benson (2001) states that investigating the efficacy of various techniques for instruction and teacher education courses is required for fostering teacher autonomy in the realm of learners. Later, Smith (2003) claims that the concept of teacher autonomy appeared in the context of learner autonomy, although insufficient effort had been expended to elucidate the meaning of this phrase. According to McGrath (2000, as cited in Raya & Vieira, 2015), the freedom that teachers possess to execute the curriculum, manage their own activities, and transcend external control is of teacher autonomy. Furthermore, according to Jimenez Raya (2017), teacher and student autonomy are the two concepts that are closely related to each other. According to Little (1995), teacher autonomy means that teachers have the authority to make decisions on their own instructional practices. Benson (2000) defines teacher autonomy as that the teachers work independently. Swatevacharkul (2024) contends that educators need to possess autonomy to make autonomous decisions on their teaching methods. Han (2013, 2017) argues that teacher authority is teachers' potential to make choices on their instructional methodologies. In summary, teacher autonomy is the freedom and ability of teachers to make decisions in their teaching to create a positive and autonomous learning environment and then promoting effective language acquisition for learners.

2.2. Teachers' practice of teacher autonomy in English language teaching

Teacher autonomy is the degree of independence and freedom that teachers possess in deciding on their curriculum, classroom management, and teaching strategies. Dikilitas and Griffiths (2017) assert that the method by which teachers enhance autonomy is an issue that has recently been discussed and investigated from several viewpoints. Teachers might benefit from positive instructions by practicing their autonomy in the classroom. First of all, there might be more interesting and successful lessons from giving teachers the freedom to select teaching strategies that suit both their teaching pREFERENCES and the needs of their students (Smith, 2003). On the other hand, too much autonomy without an appropriate pedagogical basis could lead to inconsistent or ineffectual teaching methods (Borg, 2006). Second, liberty in classroom management enables educators to address the individual dynamics of each student while fostering a supportive and inclusive learning environment (Vieira, 1999). However, according to Benson (2013), if there is too much freedom in a classroom, it will lead to a situation that out of balance disciplinary measures, which can affect the overall classroom environment. Thirdly, Dam (1995) claims that teacher autonomy might inspire students to take charge of their own education by modeling independence and critical thinking. However, some students will suffer when there is insufficient organization or unclear expectations if they don't receive the right coaching (Borg & Al-Busaidi, 2012). Dzubay (2001) affirms that asking someone to change their personality, values, and thought process is a means to ask them to change their teaching approach. Lastly, teachers with autonomy can modify the curriculum to meet students' specific requirements and interests. This makes the learning environment more relevant and meaningful (Rivers, 2011). In contrast, students might have gaps in knowledge or skills if there is a dearth of alignment with broader educational objectives or standards (Lamb, 2008). As Smith (2003) notes, while autonomy is essential, it must be balanced with institutional objectives to ensure quality education.

3. CHALLENGES OF TEACHERS IN PRACTICING TEACHER AUTONOMY IN ELT

As Wiśniewska (2007) states, teachers encounter internal and external constraints that might not benefit their autonomy. The former belongs to teachers which are their personalities, experiences, educational backgrounds, and economic status. The latter is understood at macro and micro levels. Macro constraints involve educational philosophy,

the state, its educational policy and goals, language teaching policy, curriculum, materials, and methods. Meanwhile, micro constraints combine the school community and its goals, local and school authorities, peers, parents, rules and regulations, certifications, examinations, curricula, the physical and social organization of the school, and classroom practices. Besides that, Benson (as cited in Wiśniewska, 2007) claims that policy constraints also appear in teacher autonomy. Furthermore, learner autonomy may limit teacher autonomy (Aoki, 2002; Wiśniewska, 2003, 2007).

Although teachers acknowledge what they should do in their classroom to foster learner engagement, some factors that influence their teaching include time constraints, curriculum design, materials selection, and professional development.

3.1 Time constraints

In most state institutions in Vietnam, classrooms are often overcrowded, with around 40 to 50 students and the time for each period is only 45 minutes. Additionally, students have varying levels of proficiency and are of multiple ages. Therefore, it becomes challenging for educators to design learner-centered activities. For example, this challenge arises when teaching a lesson about food and drink. Instead of using a task-based language learning approach, teachers could set up the classroom as a coffee shop and ask students to play the roles of customers and waiters, with the purpose of helping students feel more comfortable in speaking English and simultaneously helping them understand and learn how to use new words and sentence structures naturally through real-life contexts. However, with limited time and assessments based on grammar and vocabulary alone, teachers rarely implement this approach. These challenges are similar to those faced internationally, such as in Turkey and Indonesia, where high student-teacher ratios and overloaded curricula limit instructional flexibility (Isik & Balçikanli, 2020). Additionally, several teachers worry about whether students can fully comprehend all content within a short time. Therefore, teachers frequently employ traditional teaching methods to cover all necessary content.

3.2 Curriculum design

Curriculum design is one of the most important processes in preparing lesson plans or teaching materials. The curriculum content must be based on the expected outcomes of learners, proficiency levels, and teaching schedules. In many educational institutions in Vietnam, teachers are excluded from the curriculum design process because this responsibility lies with the school or the Ministry of Education. For example, the general English curriculum issued by the Ministry of Education of Vietnam in 2018 dictated the standardized content and the teaching methods. These findings align with research by Kadel (2020) and Tran & Moskovsky (2022). In comparison with the Western setting, teachers are provided greater flexibility in adapting curricula to students needs. Aoki (2002) argued that teachers are empowered to customize flexible curricula and the instruction content. This helps teachers raise their autonomy and encourages them to innovate new methods for teaching in order to meet students' requirements. However, in Vietnam, with the strict curriculum guidelines, teachers are often limited in this flexibility, resulting in standardized lesson plans that may not cater to diverse learning needs. This rigidity significantly restricts teacher autonomy, limiting their ability to tailor lessons to diverse student needs.

3.3 Materials selection

The selection of teaching materials is another area where Vietnamese teachers have limited autonomy. In some Vietnamese institutions, due to the standardization of education, teachers do not have authority to choose materials and they must use the ones that approved by the local government or higher authorities. These findings align with research from some authors, such as Gyawali (2023), Raya (2017), Kadel (2020), and Tran & Moskovsky (2022). Consequently, limitations in materials selection may result in unsuitability for certain educational settings. In vocational colleges, for example, students need knowledge relevant to their careers after graduation. However, teachers are required to use textbooks that focus only on grammar and knowledge on social sciences, which do not directly support students' professional development. Moreover, due to time constraints and limited options for material selection, teachers are often forced to use resources that may not provide practical benefits to students in the real world.

3.4 Professional development

Within the global shift, Vietnamese teachers need to enhance their knowledge and skills to be more professional and meet learners' needs. For example, with the evolution of technology and Artificial Intelligence nowadays, many teachers

in Vietnam institutions attend technology courses or workshops to strengthen their skills in applying technology in teaching. Additionally, many teachers join TESOL courses to enhance their teaching methodologies. But not all educators understand the value of lifelong learning. Some educators only teach what they learned without exploring how to improve their profession. Besides that, some other teachers would like to achieve higher education, but they encounter financial and support issues from their institution, such as attending some courses mentioned above. These issues are similar to those of some researchers (Cirocki & Anam, 2021; Gyawali, 2023; Swatevacharkul, 2022; Murray et al., 2020). These findings align with Kedal's (2020) research, which highlights the challenges teachers face in autonomous, outdated teaching and learning activities. It is not difficult for teachers to participate in any course outside their professional field due to the need to work full-time in the classroom prevents many teachers from attending conferences or workshops. Moreover, there are some educators who are hesitant to adopt new teaching methods due to a lack of technological skills or resistance to change. As a result, professional development has been a challenge for many teachers in Vietnamese education recently.

4. CONCLUSION AND RECOMMENDATION

4.1. Conclusion

Overall, while previous studies have explored teacher autonomy in various contexts, there remains a lack of comprehensive research comparing Vietnamese teacher autonomy with international perspectives. Most studies focus on constraints rather than potential solutions. Furthermore, little research has examined how Vietnamese teachers navigate these challenges in practice. This study aims to fill these gaps by critically evaluating the barriers to teacher autonomy in Vietnam and proposing strategies to enhance autonomy within the constraints of the centralized education system. Autonomous teachers are crucial for creating engaging and effective teaching experiences. As mentioned above, teachers frequently have limitations when they practice their authority in the ELT process such as time, curriculum, material selection, and professional development. More specifically, a dearth of appropriate pedagogies, basic skills in classroom management, and a lack of students' cooperation can be viewed as teachers' challenges. Therefore, some recommendations are suggested below to solve the problem and help teachers achieve the best teacher autonomy in ELT.

4.2. Recommendations

In order to foster teacher autonomy in ELT, the institutions should take these following specific measures.

Firstly, addressing the constraints of the curriculum and the selection of materials. Teachers should be empowered to generate curriculum frameworks and select materials that are appropriate for students needs. This flexibility might get students engaged and foster a more inclusive learning environment. By empowering educators in this way, we can ensure that the curriculum remains relevant and responsive to the varied backgrounds and learning styles of all students. Because English is a foreign language in Vietnam, some students find it challenging to study this subject, leading to a lack of engagement. To solve this matter, teachers could motivate students by using an active approach that adapts programs and materials. For instance, incorporate culturally relevant content, utilize interactive technology, and facilitate group discussions that encourage collaboration. According to Dikilitas & Griffiths (2017), teachers can modify the textbook to appropriate the learner's expectations. By tailoring lessons to meet the diverse needs and backgrounds of their students, teachers would improve comprehension and create a more inclusive classroom environment.

Secondly, enhancing professional development. Professional development play a crucial role in fostering a skilled workforce. School leaders should encourage teachers to develop professional skills by providing financial support and resources for instructors to learn new language teaching methodologies. For instance, encouraging teachers to attend conferences or workshops regularly to enhance their knowledge and skills as the world's understanding is constantly evolving. Many EFL teachers in Vietnam, particularly those in state educational institutions, are hesitant to pursue higher education due to their limited financial resources and low income. Therefore, receiving promotions from the institutions will motivate them and ensure improved learning outcomes. Additionally, fostering a culture of continuous learning and collaboration among teachers can further enhance their professional growth. Teachers appreciate the autonomy to manage individual knowledge and teaching procedures (Dikilitas & Griffiths, 2017).

Thirdly, reducing bureaucratic constraints. It is essential to reduce the excessive bureaucracy because it might limit teachers' ability to implement creative pedagogical strategies and affect overall educational development. In Vietnam,

teachers often face rigid administrative procedures, such as time-consuming lesson plan approvals, strictly performing a lesson plan form, and strict curriculum mandates, which leave little room for innovation. These processes should be streamlined and teachers are need to grant a greater decision to make power to enhance lesson delivery. For example, schools allow teachers to focus more on student engagement by reducing the requirement for them to submit overly detailed lesson plans for approval. Simultaneously, a collaborative framework should be established between educators and policymakers to help maintain educational standards while minimizing unnecessary regulations. Thus, addressing bureaucratic inefficiencies is crucial for fostering teacher autonomy and improving Vietnam's education system.

Finally, encourage self-regulation and self-directed learning. EFL teachers in Vietnam need to actively promote their autonomy by engaging in continuous professional development, especially given globalization and ongoing advancements in science and technology worldwide; they should seek out opportunities for workshops, online courses, and collaborative projects that enhance their skills. By doing so, they can better adapt their teaching methods to meet the diverse needs of their students and prepare them for a rapidly changing world. To encourage teachers to develop their professional capacity, schools and professional organizations where teachers work should facilitate teachers' participation in workshops and peer learning networks by providing funding as well as time for instructors to complete the necessary training. This investment will enhance the skills of individual educators and contribute to the overall improvement of the educational system in Vietnam, ultimately benefiting students and the community at large. In addition, raising awareness of teacher autonomy will empower educators to take responsibility for their professional progress, ultimately improving pedagogical effectiveness and student learning outcomes.

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REVENUE FORECASTING BY MACHINE LEARNING TECHNIQUES: A CASE STUDY OF ALCOHOLIC BEVERAGES COMPANY

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ABSTRACT

Incorporating advanced time series forecasting techniques into educational and industry practices equips learners and practitioners with the necessary abilities for data-informed decision-making, particularly for consumer goods (FMCG) sectors. This study is conducted on a sales report dataset of an alcoholic beverage firm to benchmark four forecasting models: ARIMA, SARIMAX, XGBoost, and Random Forest. Through preprocessing and exploratory data analysis addressed data outliers, seasonality, and external factors. Among the models, ARIMA exhibited the highest accuracy, with a MAPE of 12.76% and MAE of 11549.87, effectively capturing temporal trends even in its simplicity. XGBoost and SARIMAX robust performance, particularly in the capture of seasonality and non-linear relationships. The findings provide valuable insights for optimizing inventory management, production planning, and more effective sales and marketing planning, affirming ARIMA's continued utility and relevance in forecasting applications, thereby promoting operational efficiency and competitiveness in the alcoholic beverage FMCG sector.

Keywords: Alcoholic beverages, machine learning, time series, seasonal trends, revenue forecasting

1. INTRODUCTION

In the fast-paced and competitive fast-moving consumer goods (FMCG) industry, accurate revenue estimates are critical for improving supply chain operations, manufacturing planning, and strategic planning (Nyamah et al., 2022). Seasonal fluctuations, promotional efforts, legislative developments, and changing consumer tastes all have a significant impact on alcohol beverage sales volumes, making demand forecasting even more difficult (Tireki, 2021; Popova et al., 2009). In the pursuit of improving operational efficiency and optimizing profitability, organizations have increasingly recognized the necessity of utilizing sophisticated forecasting methodologies to sustain a competitive advantage (Sikder et al., 2024).

Despite widespread use of forecasting models, predicting sales in the alcoholic beverage industry remains difficult due to seasonality, promotion, and external market factors (Dwivedi et al., 2021). The purpose of this research is to compare classical and machine learning-based forecasting methodologies to determine the most successful forecasting method. Furthermore, discrepancies in past sales data, such as missing numbers, outliers, and rapid shifts caused by regulatory changes, provide issues for traditional forecasting methodologies, notably in the alcoholic beverage industry (Chase, 2021). These issues necessitate the application of advanced forecasting techniques capable of managing both linear and nonlinear relationships, as well as external business variables (Sharma et al., 2021).

Compared to more generic forecasting studies, this study focuses on the alcoholic beverage business, distinguishing it from general sales forecasting studies by emphasizing its unique characteristics. The selection of forecasting models was influenced by their proven performance and suitability for these specific situations. Traditional approaches such as ARIMA were chosen for their ability to capture linear trends and short-run interdependence (Zhang, 2003), which is especially useful for discovering stable patterns in sales data. SARIMAX, on the other hand, enhances the ARIMA model by include seasonal fluctuations and external variables, potentially making it a better model for sales that vary seasonally (Alzami et al., 2024). Machine learning methods including Random Forest and XGBoost have been demonstrated to be more successful at handling nonlinear interactions and complicated dependencies in demand forecasting (Wang et al., 2021). Their application in an industry with significant seasonality and external business necessitate remains an open research subject (Azam et al., 2023; Al Mesfer, 2023). Based on this comparison, the current study aims to compare and evaluate four different forecasting techniques—Autoregressive Integrated Moving Average (ARIMA), Seasonal ARIMA with Exogenous Variables (SARIMAX), Extreme Gradient Boosting (XGBoost), and Random Forest—to determine the

best technique for predicting sales in an alcoholic beverage company.

2. LITERATURE REVIEW AND THEORETICAL BACKGROUND

Accurate sales forecasting is a critical component of operations in the fast-moving consumer goods (FMCG) sector, as demand is determined by seasonality, promotional campaigns, and fluctuating buyer pREFERENCES. Effective forecasting techniques enable businesses to simplify inventories, avoid supply chain bottlenecks, and improve their economic strategy (Hao, 2024). Conventional forecasting models, while widely used, fall short of reflecting the complexities of consumer demand patterns in fast-changing industries such as alcoholic beverages (Nyamah et al., 2022).

2.1. Evolution of Sales Forecasting in FMCG

FMCG sales forecasting has traditionally relied on conventional statistical methods such as moving averages and exponential smoothing, which provide average trend projections but do not capture external influences or complicated seasonal patterns (Ramos et al., 2015). ARIMA has been the dominating strategy in forecasting because it can capture both linear trends and autocorrelations in time series data (Fattah et al., 2018). However, it is ineffective in dealing with nonlinear connections and rapid swings in demand, which are typical in the alcoholic beverage industry due to regulatory changes and promotional considerations (Chase, 2021).

More recent research has focused on hybrid models that combine statistical and machine learning techniques to improve forecast accuracy. For instance, Bartwal et al. (2024) demonstrated that combining ARIMA with regression-based models improves performance by accounting for external drivers such as economic variables and advertising expenditure. Similarly, hybrid models involving deep learning approaches have been found to perform effectively in capturing long-term relationships in retail sales forecasting (Hameed, 2023). Although these developments point to the advantage of integrating several approaches, little research exists that directly applies these models for forecasting sales of alcoholic beverages, where the pattern of behavior and seasonality are more accentuated.

2.2. Machine Learning Approaches for Time Series Forecasting

The advent of ML has introduced new possibilities for improving sales forecasting accuracy. Essentially, the utilization of the XGBoost algorithm to simulate errors greatly aids in rectifying final forecasted results and has gained significant attention for its ability to model nonlinear dependencies, handle missing data, and optimize forecasting accuracy through feature selection (Shan et al., 2023). Studies in the retail and FMCG industries indicated that XGBoost outperforms traditional statistical models when dealing with extremely fluctuating demand patterns (Al Mesfer, 2023). However, its performance depends on considerable feature engineering, making implementation more difficult for businesses with limited data preparation capabilities.

Random Forest, another commonly used ML technique, has been investigated for demand forecasting due to its ability to handle high-dimensional data (Khaidem et al., 2016). While effective in broad predictive analytics, decision tree-based models struggle with sequential data because they lack an inherent method for capturing temporal dependencies (Sobhani & Kaya, 2022). This constraint has prompted researchers to investigate time-aware adjustments, such as feature engineering with lag variables or incorporating Random Forest into hybrid models using ARIMA (Mishra et al., 2024).

SARIMAX (Seasonal ARIMA with Exogenous Variables) is an extension of ARIMA that includes external elements like as vacations, promotions, and economic indicators, making it especially useful for businesses with strong seasonal influences (Fattah et al., 2018). Despite its theoretical benefits, studies have found mixed outcomes in its practical deployment. While Bartwal et al. (2024) found SARIMAX beneficial for simulating demand spikes in FMCG, other research found parameter adjustment to be a considerable issue, and the model may not always outperform simpler techniques (Al Mesfer, 2023).

2.3. Novelty of this Study

Existing literature on sales forecasting has primarily focused on general retail, e-commerce, and broad FMCG categories. Few studies have specifically addressed the alcoholic beverage industry despite its unique market characteristics, including regulatory constraints, seasonal consumption patterns, and distribution complexities (de Souza Costa, 2024). Unlike previous research, this study provides an industry-specific analysis by evaluating the applicability of ARIMA, SARIMAX, XGBoost, and Random Forest in forecasting alcoholic beverage sales.

This research contributes to the field by:

– Applying forecasting models to an alcoholic beverage dataset, addressing industry-specific challenges such as seasonality and promotional effects.

– Comparing both traditional statistical methods and ML approaches to determine their effectiveness in real-world demand forecasting.

– Providing insights into the practical implementation of these models for decision-making in beverage production, inventory management, and supply chain planning.

3. METHODOLOGY

3.1. Experimental method design

The experimental methodology for this study follows a structured, multi-stage process to ensure accurate and reliable sales forecasting for an FMCG alcoholic beverage company (Figure 1).

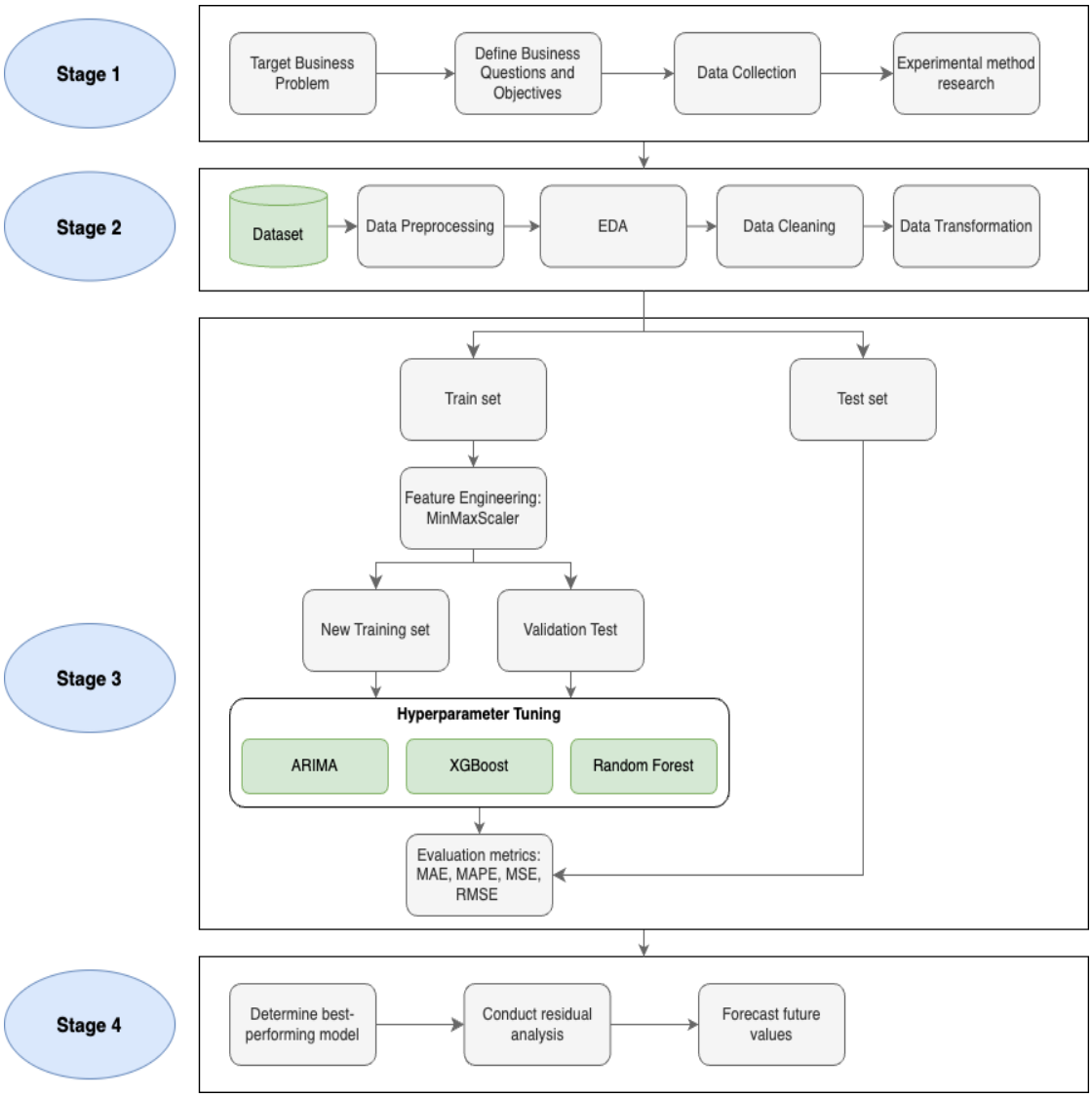


Figure 1. Experimental method design (Source: Author's own work)

The first stage involves identifying the target business problem related to sales trends, demand fluctuations, and inventory optimization and defining key objectives for the forecasting model. Then relevant sales data is collected from company reports, incorporating external factors such as promotions and seasonal effects. An experimental research method is employed to analyze the impact of various forecasting techniques on sales prediction accuracy. Following that, in the second stage, raw sales data undergoes preprocessing steps, including exploratory data analysis (EDA), data cleaning, and transformation. Through the third stage, after splitting the dataset into training and test sets, the training data undergoes feature engineering and validation testing. Three forecasting models—ARIMA, SARIMAX, XGBoost,

and Random Forest—are implemented and optimized through hyperparameter tuning. Each model's performance is evaluated using MAE, MAPE, MSE, and RMSE to determine its predictive accuracy. The results from this stage guide model selection based on error minimization. The final stage involves selecting the best-performing model based on evaluation metrics. Residual analysis is conducted to assess model reliability and identify potential overfitting. The chosen model is then used to forecast future sales, providing actionable insights for inventory management and strategic planning.

3.2. Data Collection and Pre-processing

This study utilizes a sales dataset extracted from an alcoholic beverage company in Vietnam, obtained through an e-commerce B2B platform. Covering a 23-month period from 2023 to 2024, the dataset provides various aspects of the enterprise, such as historical transaction records, capturing key attributes such as order volume, sales revenue, product categories, and timestamps. With a total of 122,475 records across 33 provinces nationwide, it includes 147 products sorted by distributors and sub-distributors, consisting of those most routinely used in the business, as well as some the company suspected might be useful in forecasting product sales. Initial data exploration revealed that approximately 7.5% of records contained missing values, while 4.2% exhibited significant outliers.

To ensure data quality and reliability, preprocessing steps included missing value imputation using mean substitution for numerical variables and mode replacement for categorical features. Outliers, primarily affecting sales revenue and order volumes, were treated using the interquartile range (IQR) method. Duplicate records, accounting for 2.8% of the dataset, were removed to maintain data integrity. Data normalization techniques such as Min-Max Scaling and Standardization were applied to numerical variables, while categorical features, including product categories and distribution channels, were encoded using one-hot and target encoding. Feature selection through correlation analysis and mutual information scores eliminated redundant variables, optimizing model efficiency.

3.3. Exploratory Data Analysis

This stage involved descriptive statistics, data visualization, and correlation analysis to facilitate an informed approach to feature selection and model development. Figure 2 illustrates the notable fluctuations and presence of periodic peaks and troughs, suggesting a seasonal component, which may be attributed to factors such as promotional activities, festive seasons, or cyclical purchasing behaviors.

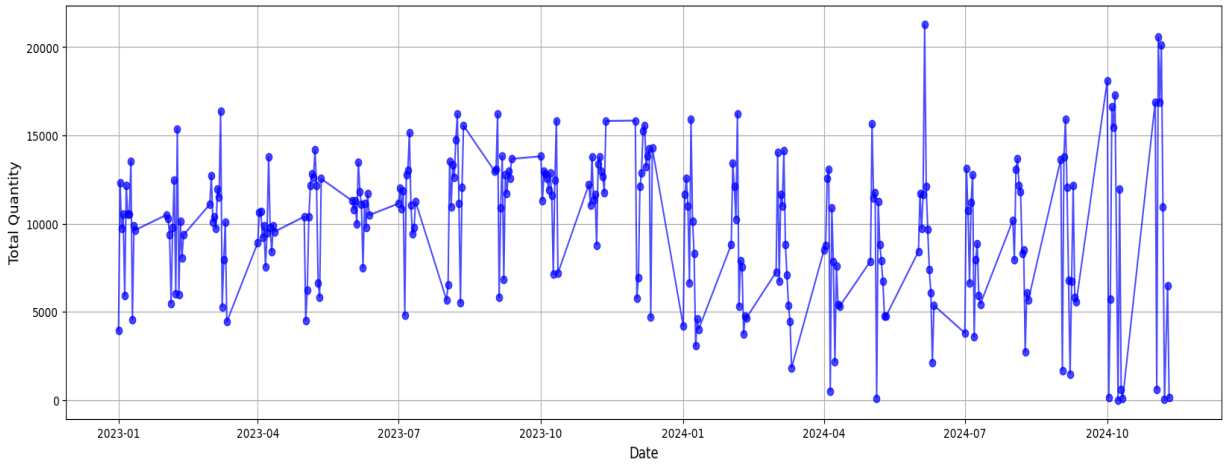


Figure 2. Time Series of Quantity (Source: Author's own work)

A correlation heatmap of encoded categorical and numerical features provides insights into relationships between key variables. Notably, a strong negative correlation (-0.76) is observed between distributor type and order type, suggesting that different distribution channels exhibit distinct purchasing behaviors. Additionally, the number of orders per month demonstrates a high negative correlation (-0.90) with the order year, reflecting potential structural shifts in sales trends over time. Besides, the chart decomposes the time series into trend, seasonality, and residuals. The trend shows a rise to 145,000 units before declining to 100,000. The seasonal component fluctuates around ±10,000 units, while the residuals have a mean near zero with a standard deviation of 8,000, capturing unexplained variability. These findings emphasize the importance of carefully selecting features for predictive modeling to mitigate multicollinearity and enhance forecasting accuracy.

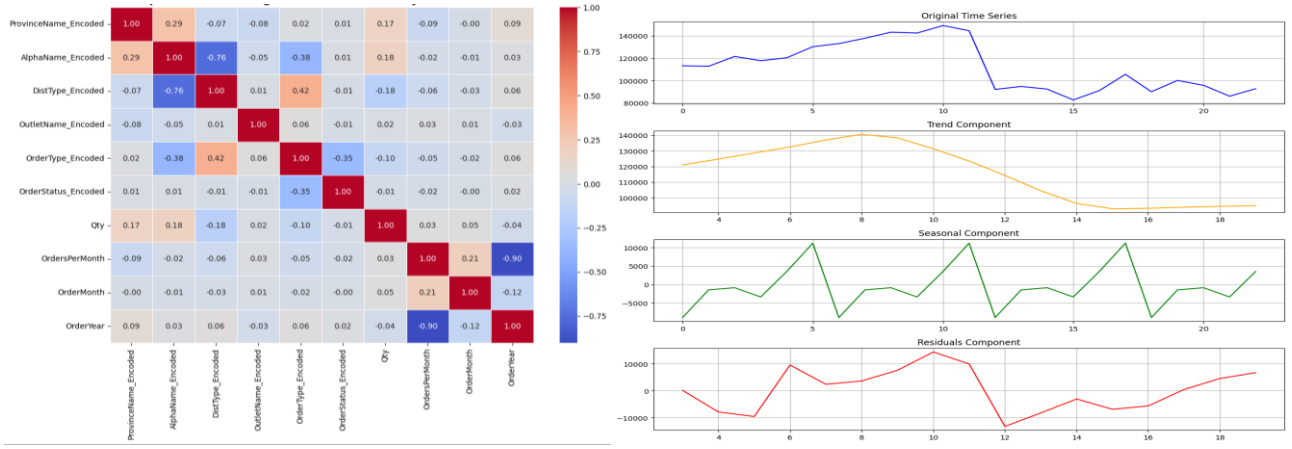


Figure 3. Heatmap of Correlation Matrix and Time Series Decomposition

(Source: Author's own work)

Furthermore, the diagonal density plots illustrate the pattern of distribution for each variable. Figure 4 illustrates the presence of multimodal patterns, especially in the variables 'Qty' and 'OrdersPerMonth', which represent changes in demand. The scatter plots identify a strong linear correlation between 'Qty' and 'vol_htls', which means an increase in quantity is associated with high volume hits. Nonetheless, the 'OrdersPerMonth' variable seems to exhibit stratification, which could result from batch processing or cyclic ordering tendencies in the data. Despite this, it still offers substantial insights into the frequency and dispersion of orders over time.

After detecting and treating outliers, the distribution of Qty (Qty) and vol_htls (Volume Hits) exhibit distinct multimodal patterns, hence the data has a number of underlying segments or classes. There are multiple peaks in both the histograms, which means periodic demand or categorical effects on ordering. The treatment used has preserved the original data structure while avoiding extreme variation, as indicated by the smoother density curves.

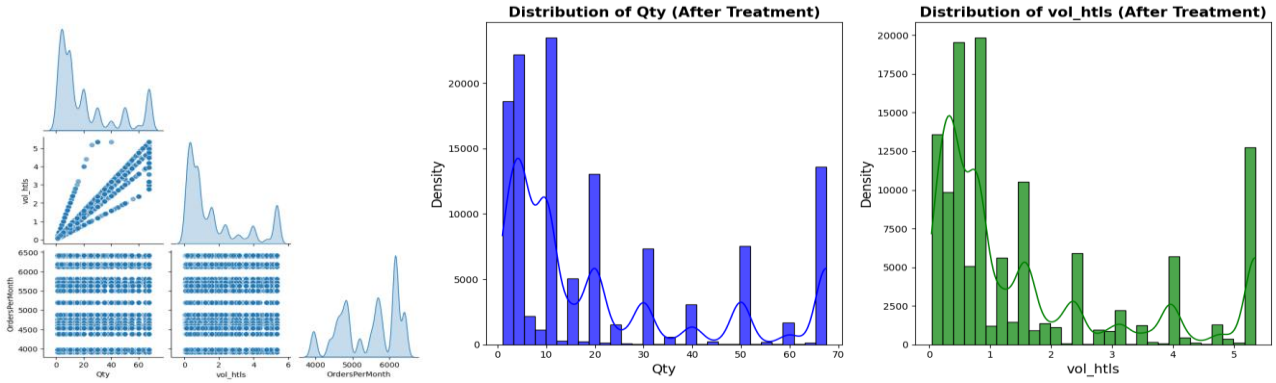


Figure 4. Pair Plot of Continuous Variables and Distribution of 'Qty' and 'vol_htls'

(Source: Author's own work)

3.4. Model Selection and Training

In the current study, four machine learning models under supervision—ARIMA, SARIMAX, XGBoost, and Random Forest—were selected for the time series forecasting of B2B sales data, as shown in Figure 5. Each model offers a different advantage in handling time series data. The models are based on their ability to conduct time series forecasting, their level of being able to identify nonlinear relationships, and their ability to incorporate external variables that influence changes in demand. There are three main steps involved in the modeling process: transforming data, training models, and tuning hyperparameters, which collectively guarantee that the model produced achieves high predictive performance.

The hold-out approach was utilized to evaluate the performance of models, whereby the data was split into 80% training and 20% testing. This allows for models to be trained on a significant portion of data while reserving an independent set to test performance. After training and hyperparameter tuning, models are evaluated on standard error metrics to determine their forecasting accuracy. The most optimal model is chosen according to how well it can reduce prediction errors without sacrificing interpretability and generalizability. Such a systematic process follows a data-driven

selection, which balances the statistical rigor with the predictive power of machine learning, thereby making the predictions of sales in the alcohol sector more accurate.

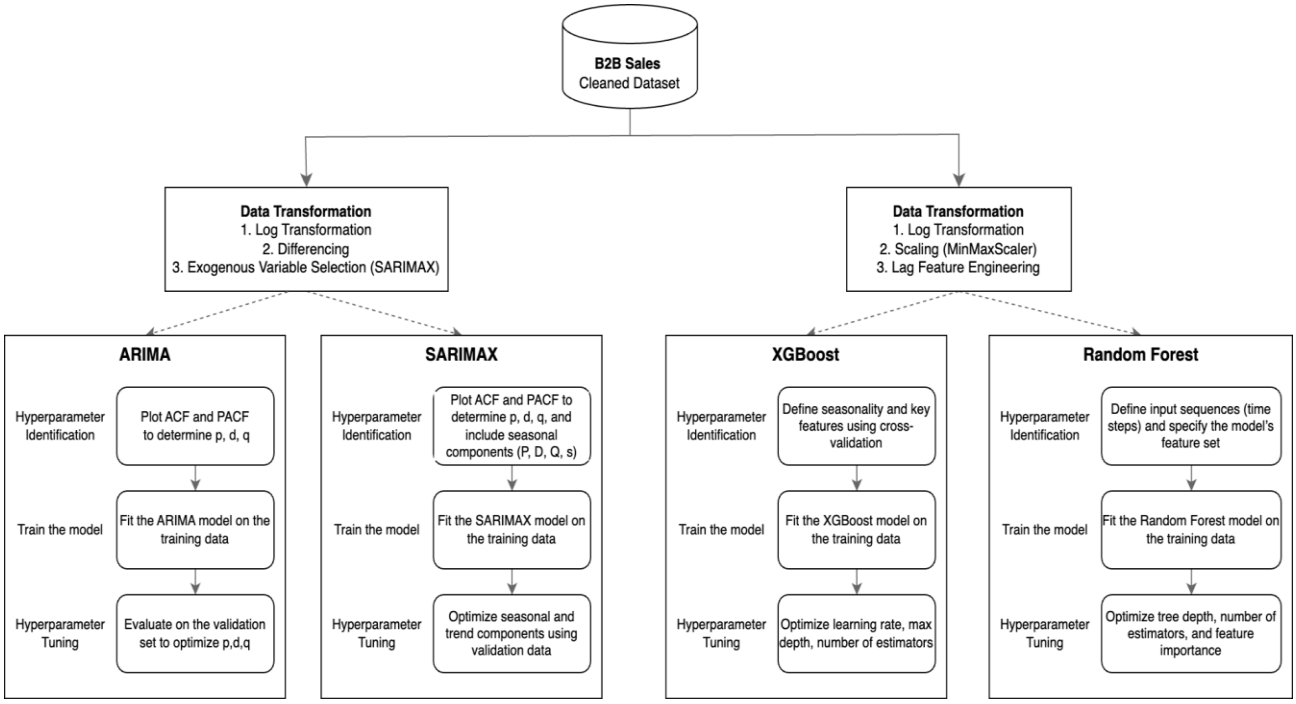


Figure 5. Model selection and training methods (Source: Author's own work)

4. EXPERIMENTAL RESULTS AND DISCUSSION

4.1. Performance Metrics

To evaluate the performance of various forecasting models, prediction accuracy is calculated using three distinct metrics. Firstly, Mean Absolute Error (MAE) calculates the average size of differences between predicted and observed values, thus giving a clear definition of forecast accuracy (Willmott & Matsuura, 2005). Secondly, Mean Squared Error (MSE) favors larger errors by squaring the differences. Lastly, Mean Absolute Percentage Error (MAPE) expresses error as a percentage with straightforward interpretation between datasets, which calculates the relative percentage error to actual values (Kim & Kim, 2016).

4.2. Experimental results

Among the four models, ARIMA demonstrated the best overall performance, achieving an MSE of 161,595,762.56, an MAE of 11,549.87, and an RMSE of 12,712.03. Notably, it achieved the lowest MAPE of 12.76%, implying that their estimates differed from actual sales by only 12.76% on average. These findings demonstrate that ARIMA accurately captures linear trends in sales data, making it the most dependable model for short-term forecasting. However, its shortcoming is its inability to simulate complex nonlinear relationships as well as external influences like promotions or economic changes.

SARIMAX, despite incorporating exogenous variables, performed worse than ARIMA, with an MSE of 609,744,816.05, an MAE of 24,693.01, and a MAPE of 25.71%. This suggests that while SARIMAX accounts for additional external influences, its increased complexity may have led to overfitting or suboptimal parameter tuning, resulting in a lower predictive accuracy. The XGBoost produced similar results to SARIMAX, with an MSE of 583,289,602.70, an MAE of 23,694.29, and an RMSE of 24,151.39. Its MAPE of 25.80% indicates that while it can model complex relationships better than ARIMA, it did not achieve substantial improvements in predictive accuracy. The relatively high error rates suggest that further feature engineering or hyperparameter adjustments are necessary for better performance.

Random Forest performed the worst, having a very low MSE (404.49) but a very high MAPE (236.54%). This suggests that while the model had low absolute error for some predictions, it was poor at percentage error since there were exceedingly small actual values for certain cases. The high MAPE can be attributed to the model not generalizing

well to all data points in a manner in which exceptionally high errors are incurred when actual values are near zero. This is one limitation that stems from Random Forest not considering temporal dependencies, thus being worse than ARIMA-based models for time series forecasting. Further analysis needs to be done to see whether data preprocessing or model hyperparameter optimization can mitigate this issue.

Table 1. Machine learning algorithms' performance (Source: Author's own work)

ML Model	MSE	MAE	RMSE	MAPE (%)
ARIMA	161595762.56	13100.75	11549.87	**12.76%**
SARIMAX	609744816.05	24693.01	23557.50	25.71%
XGBoost	583289602.70	23694.29	24151.39	25.80%
Random Forest	**360.70**	**14.88**	**18.99**	224.94%

In summary, the experimental findings suggest that ARIMA (3,1,2) is the best model to predict B2B sales in this instance, based on its higher accuracy on all measures of error. SARIMAX and XGBoost are promising, but some additional effort in feature engineering and hyperparameter optimization might be necessary to take their predictive capability to the next level. In contrast, Random Forest did not succeed in this task, which underlines the value of choosing models specifically intended to capture time series dependence. The results indicate the importance of knowing the nature of the dataset when using machine learning models for sales forecasting.

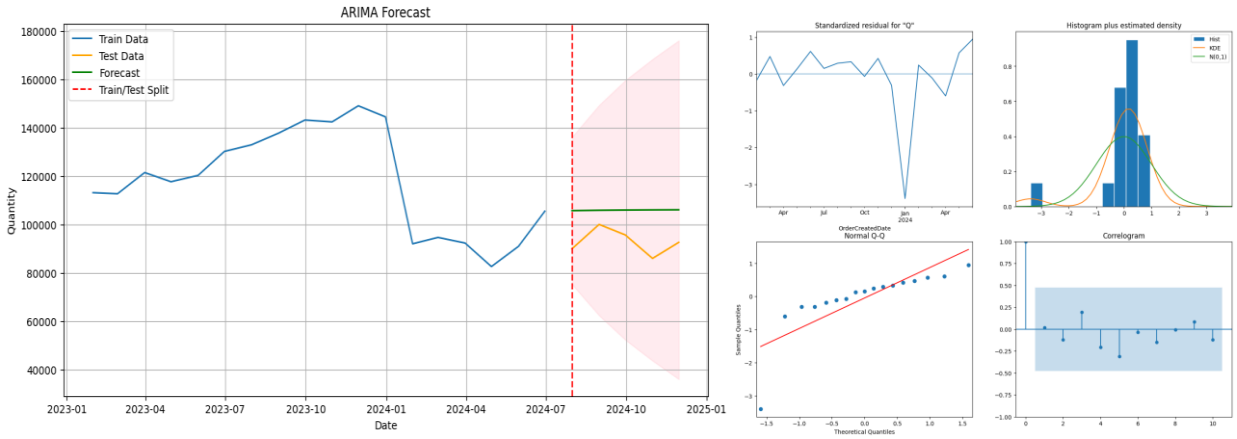


Figure 6. ARIMA Time Series Forecast Accuracy Performance (Source: Author's own work)

4.2. Discussion

The experiment's findings assist in comprehending the performance of various machine learning models in B2B sales forecasting. The huge performance margins between ARIMA, SARIMAX, XGBoost, and Random Forest highlight the importance of selecting an appropriate model based on the dataset's features as well as the type of forecasting duties.

ARIMA's superior performance, particularly as measured by MAPE (12.76%), indicates that classical time series models are still very successful when dealing with ordered, structured sales data. The model's use of autoregressive and moving average terms, together with differencing to remove trends, enables it to perform well in terms of seasonality and long-term connections. However, it lacks the ability to capture complex nonlinear relationships as well as exogenous causes such as promotions or economic changes.

On the other hand, XGBoost, a highly efficient gradient-boosting algorithm, achieved significantly higher error rates, specifically a MAPE of 25.80%, indicating that its prediction was less precise than ARIMA. This finding implies that, while XGBoost performs admirably with nonlinear connections in structured data, its application in time series forecasting necessitates careful feature architecture. Its low performance could be attributed to the lack of explicit time-dependent modeling, as it depends on lag-based features rather than intrinsic time series modeling techniques. Random Forest's low accuracy further confirms that tree-based approaches are unsuitable for time series forecasting without additional bespoke adaptations such as recurrent structures or sequence-aware transformations. Future work may incorporate the use of deep learning models such as LSTMs (Long Short-Term Memory networks) or Transformer-based models, which are designed

for sequential data. In general, these findings show the significance of data pretreatment and feature engineering are in time series forecasting.

The performance gap between machine learning and ARIMA models indicates that, while traditional statistical models remain effective for time-dependent data, machine learning models require additional transformations and demanding feature selection to be competitive. Future studies could examine ensemble methods, such as integrating ARIMA with XGBoost or LSTM models, to combine the capabilities of machine learning and statistical models. Furthermore, external variables such as economic trends, advertising campaigns, and seasonal considerations could be put into the models to help improve forecast accuracy. In short, this work demonstrates that ARIMA remains a very robust model for B2B sales forecasting and is currently beating out more sophisticated machine learning models in this case. Machine learning models such as XGBoost may have promise with some further work, but Random Forest does not appear to be the way to go without some radical modifications. This work illustrates the need for model selection, feature engineering, and hyperparameter optimization when applying predictive analytics to business problems.

5. CONCLUSION

5.1. Conclusion

As suggested by the findings of comparative analysis of the above three approaches in ARIMA, XGBoost, and Random Forest for predicting sales in the alcoholic beverage company based on 122.475 sales data, the findings ascertained that the top-performing approach among XGBoost and Random Forest was the ARIMA (3,1,2) approach, which yielded the lowest error values with an MAPE of 12.76%, thus proving to be the most trustworthy approach for structured time series data.

The results highlight the need to choose a suitable method of forecasting depending on the nature of the data set. While machine learning models like SARIMAX and XGBoost have the capacity to capture intricate interactions, they need special preprocessing, feature selection, and tuning to be able to produce competitive results in time series forecasting. ARIMA is still, nevertheless, a viable, stable option for structured, seasonal sales data, especially when computational efficiency and interpretability are the foremost considerations to be remembered.

Despite the findings, this research contains several limitations. Firstly, the models relied solely on historical sales data without considerations of external market forces such as promotions, economic shifts, and competitor actions, which would bring enormous effects to forecasting performance. Secondly, the size and granularity of the dataset may have limited the models' ability to capture complex patterns, particularly for machine learning-based models such as XGBoost and Random Forest. Finally, the study did not look into hybrid models or deep learning methods that might yield more accurate long-term forecasting outcomes.

5.2. Future works

Future studies need to include external variables like promotions, economic indicators, and competitor activity to continue improving forecast accuracy. Hybrid models, such as ARIMA-XGBoost or ARIMA-LSTM, may integrate the strengths of machine learning and statistical methods. Deep learning methods (e.g., LSTM, Transformers) could also enhance long-term forecasting.

In addition, additional optimization with automatic hyperparameter tuning (e.g., Bayesian Optimization) and real-time prediction applications would increase responsiveness. These would enable businesses to make data-driven, informed decisions in demand planning and inventory management.

Overall, although ARIMA is the leading performing model in this research, the prospects of sophisticated hybrid and deep learning models offer some promising research and practical application avenues in the future in the B2B alcoholic drinks sector and elsewhere.

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FOREIGN LANGUAGE CLASSROOM ANXIETY: A SYSTEMATIC REVIEW OF INFLUENTIAL FACTORS AND ITS IMPACTS ON ENGLISH LANGUAGE EDUCATION

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ABSTRACT

Foreign Language Classroom Anxiety (FLCA), as a distinct form of anxiety, has received considerable critical attention due to its influence on the English as a Foreign Language (EFL) learning experience. Over the decades, a growing body of literature has acknowledged FLCA as one of the key affective factors that can impact EFL learners in several aspects, such as motivation, confidence, and academic achievement. This paper aims to provide a comprehensive review of FLCA by focusing on its theoretical framework, factors contributing to FLCA, and how this form of anxiety affects language learning. In this paper, a brief overview of Horwitz, Horwitz, and Cope's (1986) FLCA theory is discussed and followed by the synthesized key findings from empirical studies investigating the causes and effects of FLCA in EFL contexts. The paper concludes with practical implications for educational stakeholders to mitigate the negative effects of FLCA. Additionally, future research is proposed to focus on specific factors that are responsible for anxiety, thereby offering more targeted intervention strategies in addressing this issue.

Keywords: Anxiety, Foreign Language Classroom Anxiety, Language Learning

1. INTRODUCTION

The investigation of the psychological factors influencing language acquisition and overall language learning experience has been highlighted by a substantial body of research. These factors have been recognized to vary widely among learners. Krashen's (1982) Affective Filter Hypothesis highlights that emotional variables, namely motivation, self-confidence, and anxiety can either contribute to the success or failure of second language acquisition. Among the emotional variables associated with language learning, anxiety stands out as one of the most influential factors (MacIntyre, 2002). Tran et al. (2013) suggest a correlation between anxiety and motivation among language learners by showing that students who experience higher levels of anxiety tend to be less motivated in language learning. In addition, anxiety is also identified as a major predictor of students' avoidance behavior, performance, and achievement since it can act as a barrier to effective language learning (Liu & Huang, 2011). Collectively, it becomes apparent that anxiety can profoundly affect the success of language learning and warrants careful consideration. A comprehensive understanding of its underlying causes and impacts is essential to inform effective strategies to mitigate its negative effects and foster improved language acquisition among learners.

In the landscape of English as a Foreign Language (EFL) research within the Vietnamese context, Foreign Language Classroom Anxiety (FLCA) has been widely recognized as a psychological barrier that affects students' ability to engage and perform (Hoang, 2022; Vuong et al., 2024; Le & Khau, 2025). Anxiety is also recognized to usually result in students' frequent passivity during English lessons, uch passivity may involve avoiding participation, remaining quiet, or fading into the background; some students may exhibit limited engagement or reluctance to speak up even when they have valuable ideas to contribute. Given the profound impact that anxiety has on EFL learners, it is crucial to provide resources that grant access to a comprehensive overview of this issue. Hence, this paper aims to provide a comprehensive analysis of FLCA in English language education by examining its potential sources and discussing its impacts based on a synthesis of key findings from existing EFL research.

2. HORWITZ, HORWITZ AND COPE'S (1986) THEORY OF FOREIGN LANGUAGE CLASSROOM ANXIETY

2.1 Definition of FLCA

In 1986, Horwitz et al. popularized the term Foreign Language Classroom Anxiety (FLCA) to describe a unique type of anxiety related to language learning in educational settings. They differentiated FLCA from other forms of anxiety by introducing it as "a distinct complex construct of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of language learning process". This pioneering research marked a prominent milestone by recognizing and drawing attention to the need for addressing FLCA as a novel challenge faced by language learners. Moreover, their significant contribution has established a theoretical model that serves as a solid foundation for numerous subsequent explorations into anxiety among language learners. Macintyre and Gardner (1994) further define FLCA as individuals' feelings of tension and apprehension, which particularly arise in situations where they are supposed to speak, listen to, and learn a target foreign language. Taken as a whole, these definitions collectively indicate the progressive acknowledgment of FLCA as a distinct form of anxiety to highlight its significance in the field of language learning research.

Figure 1 offers an overview of FLCA with its related anxieties and measurement. The following sections will delve deeper into each component.

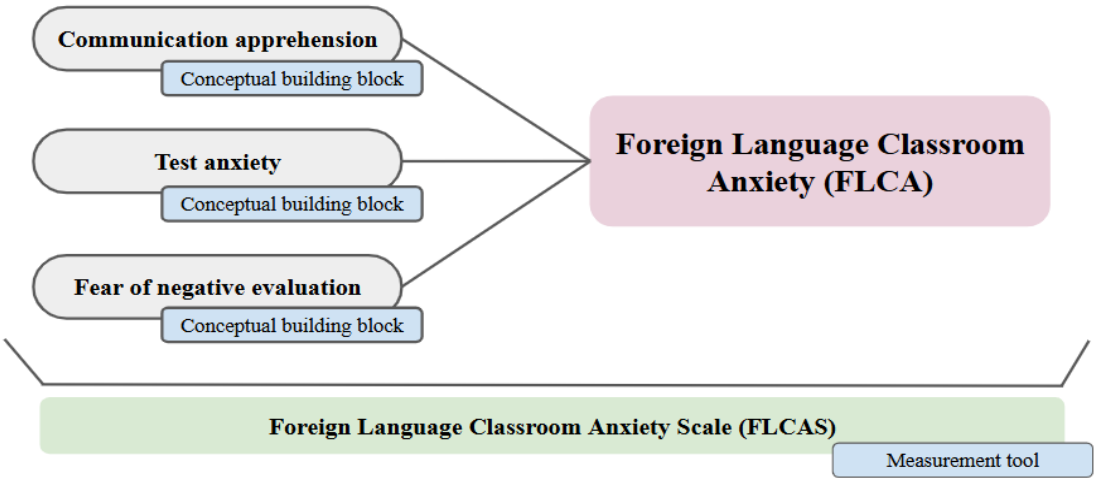


Figure 1. Theoretical Framework of Foreign Language Classroom Anxiety

2.2. Performance anxieties related to FLCA

Within the theoretical framework proposed by Horwitz et al. in 1986, FLCA manifests in three performance anxieties, namely *communication apprehension*, *test anxiety*, and *fear of negative evaluation*. However, they emphasize that these three fears only offer "useful conceptual building blocks" for FLCA to arise without completely consolidating this psychological construct. In other words, they argue that FLCA is not simply the combination of these fears applied to language learning. This is based on their view that the psychological complexity and uniqueness of FLCA are shaped by various internal factors specific to each language learner.

Communication apprehension typically involves nervousness that occurs when speaking in and listening to the target language. This often results from learners' lack of self-confidence or fear of making mistakes while speaking. Struggles in processing spoken input in the target language also contribute to *communication apprehension*, especially among learners who believe they must understand every word to grasp the overall message.

Test anxiety is associated with the stress and worries that students experience regarding assessments and evaluations in foreign language education. Test-anxious language learners tend to become overwhelmed by frequent tests, quizzes, and exams, regardless of how well-prepared they are. Particularly, oral tests are suggested to be especially challenging for nervous students as this type of assessment holds the potential to trigger both communication apprehension and test anxiety simultaneously.

Finally, *fear of negative evaluation* arises from a learner's fear of being judged or criticized by their teachers or peers regarding their language performance. In some scenarios, this stems from learners' assumptions that their peers are better at the target language than themselves. Learners with *fear of negative evaluation* often withdraw from volunteering

answers and feel embarrassed if they are being called upon unexpectedly.

2.3. Foreign Language Classroom Anxiety Scale

Another major contribution of Horwitz, Horwitz and Cope's Theory of Foreign Language Classroom Anxiety is the Foreign Language Classroom Anxiety Scale (FLCAS) used to measure the anxiety among learners based on their attitudes, subjective perceptions, beliefs, and feelings toward foreign language classes. This is a self-report instrument that consists of 33 items, each item is rated on a 5-point Likert scale spanning from "strongly agree" to "strongly disagree". The scale has demonstrated strong internal reliability, with a reported alpha coefficient of .93, and all items have shown significant corrected item-total correlations (Horwitz et al., 1986).

Nonetheless, the scope and emphasis of the FLCAS encountered criticism. Rodríguez and Abreu (2003) point out that the scale primarily deals with anxiety related to speaking rather than concerning all aspects of language learning. Sparks and Ganschow (2007) additionally highlight that the scale might not solely measure learners' anxiety levels as its items reflect students' perceptions and attitudes toward language learning. These critiques highlight the potential limitations of the FLCAS; however, they do not entirely diminish its value and significance as a foundational instrument in language anxiety research. A possible explanation for this ongoing discussion over the FLCAS may be due to the complex nature of FLCA, which occurs in individual contexts among learners. This could be attributed to multiple factors, such as differences in participant characteristics across studies, their fluctuation of anxiety over time, and variations in perceptions regarding language competence. Moreover, the in-depth investigation of FLCA could be challenged by the evolution of language teaching methodologies, the emphasis placed on certain language skills or language areas within various educational curricula, and the influence of learners' learning styles on their anxiety.

3. Factors Contributing to Anxiety among EFL Learners

What causes FLCA among learners has received great attention in foreign language learning research with numerous investigations that yielded insightful results. Many of these studies rely on the theory established in 1986 by Howitz et al, the FLCAS is prevalently employed alongside other qualitative instruments to explore sources of anxiety in a more nuanced manner. Within the learner-centric perspective, several causes have been identified and the legitimate broad categorization for them are internal factors and external factors.

Dalkılıç (2001) suggests that FLCA potentially stems from the lack of language knowledge, self-doubting, shyness, or high expectations of others. Dewaele et al. (2008) emphasize the significance of learners' perceptions as a key factor causing FLCA. Additionally, factors such as the unease associated with speaking a foreign language, low self-esteem, and interpersonal difficulties among learners have been recognized as significant contributors to their FLCA (Mahmoodzadeh, 2013). In a study conducted in 2013, Tran et al. identified learner-related factors as the most significant source of FLCA, these factors include the learning ability, attitudes to the target language learning, and prior negative learning experiences.

How educators contribute to the FLCA among learners is also acknowledged in the literature. Argaman and Abu-Rabia (2002) state that teachers' strict attitudes and personalities can provoke learners' FLCA. Tóth (2011) further supports the notion of the influential role of teachers by revealing learners' distressing experiences of being corrected publicly and receiving disparaging remarks. Additionally, Kraľova and Petrova (2017) highlight the challenges that arise from the struggles of learners in comprehending instructions from their teachers during the lesson and effective communication, which can contribute to FLCA. Moreover, learners can experience more severe speaking anxiety when being frequently called upon by their teachers to answer questions in class. Learners with speaking anxiety attribute their speaking anxiety to factors such as their English-speaking abilities, the nature of teachers' questions, the fear of losing face and being judged, as well as the fear of receiving low scores (Ho & Truong, 2022).

It is crucial to recognize that learners' subjective perceptions play a significant role in shaping their actual experiences of FLCA. These perceptions could profoundly influence how learners interpret the causes of FLCA they encounter, regardless of whether they originate from internal or external factors.

4. EFFECTS OF FLCA ON LANGUAGE LEARNING IN EFL CLASSROOMS

A substantial body of research has been dedicated to investigating the effects of FLCA, and it has been recognized

as a psychological barrier that affects students' ability to engage and perform. Bekleyen (2009) suggests that anxious EFL learners exhibit a greater tendency to not volunteer in spoken classes, which consequently limits their overall engagement in the language learning process. Anxiety can hinder students' enjoyment of the learning process and, in extreme cases, may result in a loss of motivation and interest in language learning (Tran et al., 2013). Similarly, Dewey et al. (2018) demonstrate the adverse effects of anxiety on second language acquisition. Furthermore, Jin et al. (2020) highlight that anxiety caused by negative feedback can lead to ongoing emotional insecurity among EFL learners, including distraction, fear of making errors, and excessive concern about others' evaluations.

The effect of FLCA on learners' academic achievement in the target language has recently received great attention in the body of research. Nurul et al. (2022) indicate a positive correlation between anxiety and academic success in reading among Indonesian EFL students. However, no consistent findings are indicated by Azzahra and Fatimahb (2023), whose research reports no significant relationship between FLCA and academic achievement; they argue that anxiety may not influence academic achievement when learners have ample time for both theoretical study and practical engagement in language learning. These mixed findings regarding the relationship between FLCA and academic achievement challenge the conventional assumption that anxiety will hinder academic performance and emphasize the complexity of FLCA's influence.

In general, the literature has mostly acknowledged the negative impacts of anxiety on EFL learners' psychological well-being, classroom behavior, and overall language learning outcomes. However, to what extent FLCA impacts academic achievement remains ambiguous, with both positive and negative correlations reported. These variations suggest the significance of considering individual differences among learners. The far-reaching consequences of FLCA are recognized and this highlights the need for future research that continues to explore effective strategies for managing FLCA to optimize the language learning potential of learners.

5. CONCLUSION AND RECOMMENDATIONS

Since FLCA was popularized in 1986, it has been consistently investigated in the field of EFL, with researchers recognizing various factors - which each can be either internal or external - that cause anxiety among learners. Within the body of research, the negative impact that FLCA has on learners has been widely highlighted. This paper examined the prominent theoretical framework of FLCA, synthesized key findings on FLCA's potential causes, and discussed what existing EFL research suggests regarding its influence on learners.

It is of paramount importance to raise teachers' awareness of FLCA and its connection to their instructional practices. To better support learners' emotional needs, EFL teachers are encouraged to be mindful of how their classroom behaviors influence the overall learning experience. A key policy priority should therefore be to plan for the development of educational frameworks and training programs equipping teachers with strategies to foster a supportive learning environment.

More broadly, further studies regarding individual factors that contribute to FLCA would be worthwhile, as this effort will potentially shed light on how to develop more targeted intervention strategies to help learners effectively cope with FLCA. The examination of each anxiety source in isolation while combining perspectives from both learners and teachers may result in insightful findings and effective solutions.

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THE IMPACT OF THE GREEN LOGISTICS PERFORMANCE INDEX ON THE BALANCE OF TRADE OF ASIAN COUNTRIES IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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ABSTRACT

In the context of globalization, sustainable development has become a prevailing trend among economies worldwide, particularly in Asia. Among the key factors influencing this process, the Green Logistics Performance Index (GLPI) has emerged as a novel and essential economic indicator. This study investigates the impact of the Green Logistics Performance Index on the balance of trade of Asian countries during the period 2013 - 2023. By employing panel data from 44 countries and territories within the region and applying the System Generalized Method of Moments (SGMM), the results reveal that the Green Logistics Performance Index exerts a significantly positive and substantial impact on the balance of trade. Additionally, several economic factors, such as trade facilitation, foreign direct investment (FDI), and the real effective exchange rate, are found to contribute positively to the balance of trade improvement. In contrast, an inverse relationship is observed between balance of trade and both GDP growth and rising oil prices over the same period. Based on these findings, the authors propose a number of policy recommendations to sustain and enhance balance of trade performance while promoting the overarching goal of sustainable development.

Keywords: Balance of trade, Asia, green logistics performance index, SGMM, sustainable development

1. INTRODUCTION

Over the past decade, from 2013 to 2023, global balance of trades fluctuated due to major shocks like COVID-19 and the Russia-Ukraine conflict. The pandemic disrupted supply chains (Baldwin & Tomiura, 2020), while the war drove up oil prices and logistics costs, especially on Asia-Europe routes (UNCTAD, 2022). The global recovery has been slow and fragile (World Bank, 2023), particularly East, South, and Central Asia facing inflation, fiscal deficits, and rising logistics costs (World Bank, 2022). A stable balance of trade is crucial for sustainable development, economic stability, and international cooperation. While many studies (Ming-Miin Yu, 2025; Fan et al., 2022; Weerasinghe & Perera, 2019) explore economic factors affecting trade, the role of Green Logistics Performance Index (GLPI) remains underexplored. This study examines the link between GLPI and balance of trade across 44 Asian countries from 2013 to 2023, while controlling for other economic factors. The findings offer insights for governments on forecasting economic trends, developing sustainable trade policies, and guiding investors in assessing Asian markets. The paper is structured into five sections. The first section introduces the study, the second presents the theoretical framework and research hypotheses, the third outlines the research methodology, the fourth discusses the research findings and analysis, and the fifth provides the conclusion.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

2.1. Literature review and theoretical background

2.1.1. Overview of previous studies

To manage trade deficits and maintain balanced trade, many studies have explored factors influencing trade performance. With increasing regional integration, global trade highlights the need for efficient supply chain management (Ming-Miin Yu, 2025). In line with global sustainability trends, green logistics has become a key factor shaping regional trade (Mai Ngoc Tran, 2024). Previous studies show that the Green Logistics Performance Index (GLPI) positively affects export probability and volume (Wang et al., 2018; Thu Hien Le et al., 2022). In RCEP countries, green logistics also boosts China's exports to regional partners (Fan et al., 2022).

Trade facilitation has also been shown to improve balance of trade (Yeo & Deng, 2020), with similar positive impacts

on trade volume across regions (Gao Xin et al., 2024; Chu Qiao, 2023). Additionally, GDP growth has a positive relationship with balance of trade (Weerasinghe & Perera, 2019; Laksono et al., 2020). FDI enhances trade performance (Adi Cristanto & Ari Bowo, 2021), while real effective exchange rates (REER) negatively affect balance of trade. Meanwhile, oil prices (OP) significantly impact trade performance through both price increases and declines (Balli et al., 2021). With rising sea freight and oil prices (UNCTAD, 2022), controlling trade deficits has become increasingly difficult. However, green logistics helps lower costs and improve trade performance (Graham et al., 2018). While many studies examine macroeconomic factors such as GDP, REER, FDI, and oil prices, research directly linking GLPI to balance of trade, especially within the sustainability context, remains limited. Most studies focus on how GLPI affects productivity or environmental goals (Starostka-Patyk et al., 2024; Sikder et al., 2024; Roy & Mohanty, 2023), rather than its direct role in shaping balance of trade, a key economic indicator.

This study addresses this gap by analyzing how GLPI influences balance of trade across 44 Asian countries and territories from 2013 to 2023.

2.1.2. Theoretical background

Balance of trade

Balance of trade (BOT) is a widely used concept in economics, particularly in the field of international trade. It represents the largest component of the current account within a country's balance of payments, capturing the value difference between exports and imports at a given time (monthly, quarterly, or annually) (Widya Ayu Harahap et al., 2023). Excluding services, the merchandise balance of trade reflects the gap between the value of exported goods (typically measured at FOB prices) and imported goods (typically measured at CIF prices) of a country or territory over a specific period (Nguyen Phuong Chi, 2018).

2.2. Research hypothesis

2.2.1. Trade facilitation and balance of trade

Trade facilitation, as defined by Behar and Venables (2011), refers to simplifying and harmonizing trade procedures to minimize barriers and reduce transportation costs. Using Structural Equation Modeling (SEM), Yeo and Deng (2020) found a positive relationship between trade facilitation and international trade across 62 countries from 2010 to 2018.

Similarly, Iwanow and Kirkpatrick (2007) estimated that a 10% improvement in trade facilitation could increase total trade volume by approximately 5%, thereby contributing to a more favorable balance of trade. Examining bilateral trade between China and ASEAN, Chu Qiao (2023) further confirmed that improved trade facilitation within ASEAN countries significantly boosts trade flows with China. Building on these findings, the following hypothesis is proposed:

H1: *Trade facilitation has a* ***positive*** *relationship with the balance of trade.*

2.2.2. Green logistics performance index and balance of trade

As a key sector driving national economic growth, the logistics industry plays a crucial role in enhancing the competitiveness of international trade (Bensassi et al., 2015). However, growing environmental concerns have placed significant pressure on economic and trade development, making green logistics an essential factor. Unlike traditional logistics practices, green logistics - measured through the Green Logistics Performance Index (GLPI) - not only mitigates negative environmental impacts but also optimizes the use of logistics resources, thereby directly influencing international trade efficiency and the balance of trade (Seroka-Stolka & Ociepa-Kubicka, 2019).

One of the primary reasons why GLPI has a significant impact on the balance of trade is the increasing number of international trade regulations related to green logistics criteria. Developed countries, particularly the European Union (EU), the United States, and Japan, have implemented stricter trade policies requiring imported goods to meet standards on carbon emission reduction, biofuel usage, and supply chain optimization to limit environmental impacts. Non-compliance with these standards can lead to non-tariff barriers, reducing market access for exporting countries that fail to meet these requirements (Wang et al., 2018). In this context, countries with high GLPI scores often benefit from trade incentives, leading to increased export volumes and an improved balance of trade.

Additionally, the adoption of green logistics standards also helps reduce logistics costs, particularly in Asian countries, where logistics expenses often constitute a significant portion of product costs. According to Le et al. (2022),

businesses in this region that implement green logistics measures such as route optimization, fuel-efficient transportation, and smart supply chain management technologies can significantly reduce transportation and warehousing costs. This not only enhances the competitiveness of export goods but also improves the balance of trade by increasing the net value of exports relative to imports. Furthermore, green logistics plays a crucial role in building sustainable supply chains, thereby strengthening trade relationships between nations. Previous studies have shown that exporting countries with high GLPI scores are more likely to attract orders from trade partners with stringent sustainability requirements while also benefiting from free trade agreements with preferential terms for businesses implementing green logistics (Seroka-Stolka & Ociepa-Kubicka, 2019). As a result, trade flows between nations are facilitated, creating favorable conditions for export growth and positively impacting the balance of trade.

Recognizing the significant role of green logistics, Wang et al. (2018) conducted a study on the impact of GLPI on international trade across 113 developed and developing countries from 2007 to 2014. Using the gravity model, their findings confirmed that GLPI positively influences both export volume and export share, thereby directly shaping import-export relationships and ultimately affecting the balance of trade. Similarly, Le et al. (2022) examined the role of green logistics in promoting international trade among APEC economies between 2010 and 2018, demonstrating that exporters adopting green logistics practices significantly increased their export volumes to other APEC members, thereby improving the balance of trade.

Based on the above theoretical and empirical foundations, this study proposes the following hypothesis:

H2: The green logistics performance index has a positive relationship with the balance of trade.

2.2.3. Gross domestic product and balance of trade

A substantial body of research has highlighted a significant relationship between GDP and balance of trade. Specifically, a study by Jayathilaka et al. (2022) investigated the impact of gross domestic product on balance of trade across 142 countries worldwide. Using a Random Effects Model (REM), the study revealed a rather complex correlation between GDP and balance of trade. However, within the Asian region, GDP was found to exert a considerable negative effect on net exports. Similarly, Pan et al. (2022) examined the relationship between GDP and balance of trade in China, concluding that increases (decreases) in GDP were associated with corresponding increases (decreases) in trade deficits. On the other hand, contrasting findings were reported by Weerasinghe and Perera (2019), who explored the link between GDP and balance of trade in Sri Lanka from 2000 to 2015, showing that GDP had a positive correlation with the country's balance of trade. Based on prior research, the following hypothesis is proposed:

H3: Gross domestic product has a **negative** relationship with the balance of trade.

2.2.4. Oil prices and balance of trade

Oil prices have been shown to exhibit a significant relationship with balance of trade. Studies by Balli et al. (2021) and Baek (2020) examined this relationship and highlighted the asymmetric impact of oil prices on balance of trade. Specifically, Pan et al. (2022) investigated the link between oil prices and balance of trade in China, revealing that rising (falling) oil prices contributed to an increase (decrease) in trade deficits. Similarly, Ahad and Anwer (2019) applied the Autoregressive Distributed Lag approach to explore both short-term and long-term correlations between oil prices and balance of trade in Pakistan, confirming the adverse effects of oil price fluctuations on the country’s balance of trade. However, in a different geographic context, Ahad and Anwer (2021) extended their analysis to BRICS nations and found a significantly positive relationship between oil prices and balance of trade in Brazil, India, China, and South Africa. Based on the existing literature, the following hypothesis is proposed:

H4: Oil prices have a **negative** relationship with the balance of trade.

2.2.5. Real effective exchange rate and balance of trade

Several studies confirm a close relationship between the real effective exchange rate and international trade, directly influencing export and import flows. Some studies found a positive effect of REER on the balance of trade. For instance, Myoung Shik Choi (2020) demonstrated that REER positively impacts the balance of trade in open economies participating in global value chains. Similarly, Dilanchiev et al. (2022) revealed that REER positively affects Georgia-China balance of trade in the long run, but has a negative short-term effect. On the other hand, other studies reported a

negative impact of REER. Using the ARDL approach, Keho (2020) found that REER depreciation significantly improves Côte d'Ivoire's balance of trade in both the short and long run. Considering the characteristics of the Asian region, the authors propose the following hypothesis:

H5: *Real effective exchange rate has a* ***positive*** *relationship with the balance of trade.*

2.2.6. Foreign direct investment and balance of trade

Foreign direct investment (FDI) is widely recognized as a key driver of trade, with several studies highlighting its positive impact on the balance of trade. For example, John et al. (2025) examined FDI and balance of trade in Sub-Saharan Africa and found that higher FDI leads to improved balance of trade, as exports surpass imports. Similarly, Osaretin Olurotimi et al. (2025) reached the same conclusion in Côte d'Ivoire, emphasizing FDI's role in boosting export performance. In Indonesia, Cristanto and Bowo (2021) applied a Vector Error Correction Model (VECM) and confirmed that FDI positively influences the balance of trade in both the short and long run. Based on previous studies, the authors propose the following hypothesis:

H6: *Foreign direct investment has a significant* ***positive*** *relationship with the balance of trade.*

3. RESEARCH METHODOLOGY

3.1. Research data

This study uses panel data on the balance of trade from 44 Asian countries and territories during the period 2013-2023, including: Afghanistan, Saudi Arabia, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brunei, Cambodia, China, Cyprus, United Arab Emirates (UAE), Timor-Leste, Georgia, South Korea, India, Indonesia, Iran, Iraq, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Laos, Lebanon, Maldives, Mongolia, Malaysia, Japan, Nepal, Oman, Pakistan, Philippines, Qatar, Singapore, Sri Lanka, Syria, Tajikistan, Thailand, Turkey (Asian part), Turkmenistan, Uzbekistan, Vietnam, and Yemen. After data cleaning, removing outliers and missing observations, the final dataset contains 308 observations from the 44 selected countries and territories in Asia.

3.2. Research model

3.2.1. Measurement methods

Measuring green logistics performance index (GLPI)

Building on the previous study by Mingyue Fan et al. (2022), the authors calculate the Green Logistics Performance Index (GLPI) based on six sub-indicators from the traditional Logistics Performance Index (LPI). For years with missing data, the LPI is estimated using the average of adjacent years. In addition, this study focuses on the role of the green level score, which includes the greenhouse gas emission intensity index (covering CO_2, N_2O, CH_4, and F-gas) and the fossil fuel consumption index to construct the GLPI.

This study collects data on the emission intensity of CO_2, N_2O, CH_4, F-gas, and fossil fuel consumption from Asian countries and territories, then calculates the green level score (GLS) using the entropy weighting method. Next, the normalized values of the LPI and GLS, processed using the min-max normalization method, are re-weighted using the entropy weighting method for the second time to calculate the Green Logistics Performance Index (GLPI). This process aims to positively align the index with the sustainability goals of Asian countries and territories during the 2013-2023 period.

Measuring trade facilitation (TF)

In line with the sustainable economic development goal (SDG 8), this study focuses on digital and sustainable aspects of trade facilitation measures. Data is mainly sourced from the UN Global Survey, which evaluates the implementation of trade facilitation measures across Asian countries and territories from 2013 to 2023. The survey assesses five key factors: Transparency, Formalities, Institutional Arrangement and Cooperation, Paperless Trade, and Cross-Border Paperless Trade (K Toshevska - Trpchevska et al., 2024).

This survey, previously called the UN Global Survey on Trade Facilitation and Paperless Trade Implementation, has been conducted every two years by UN regional commissions (ECA, ECE, ECLAC, ESCAP, and ESCWA) in collaboration with UNCTAD since 2015. Trade facilitation scores are measured as percentages, and for years with missing

data, values are interpolated using the average of adjacent years.

3.2.2. Research model

Building on previous studies on balance of trade (K Toshevska-Trpchevska et al., 2024; Alassane D. Yeo & Aimin Deng, 2020), the authors conduct a regression analysis to examine factors affecting the balance of trade of Asian countries and territories from 2013 to 2023. In the context of sustainable economic development, the study places special focus on the role and impact of the Green Logistics Performance Index (GLPI) through the following regression model:

$$ln(X/M) = \beta_0 + \beta_1 lnX/M_{i,j\,(t-1)} + \beta_2 GLPI_{i,j} + \beta_3 TF_{i,j} + \beta_4 OP_{i,j} + \beta_5 REER_{i,j} + \beta_6 lnGDP_{t,j} + \beta_7 lnFDI_{i,j} + \varepsilon_{i,j}$$

Where *i* represents the country and *j* represents the year. The dependent variable, ln(X/M), is the natural logarithm of the balance of trade. $\beta_{0,}$ $\beta_{1,...}$ are the estimated coefficients, and the independent variables represent the influencing factors. The error term (ε) reflects the difference between the actual and predicted values from the regression model.

3.3. Estimation method

This study employs panel data regression methods, including Pooled OLS (POLS), Fixed Effects Model (FEM), Random Effects Model (REM), and Generalized Least Squares (GLS) to address heteroskedasticity and autocorrelation issues. However, to deal with potential endogeneity, the authors apply the Two-step System Generalized Method of Moments (SGMM), using lagged variables and population (POP) as instrumental variables. The population variable has an F-statistic of 81.34 (greater than 10), confirming it as a strong instrument. After estimating the SGMM model, the Arellano-Bond, Sargan, and Hansen tests are conducted to check for second-order autocorrelation and the overall validity of the model. The results show that the Two-step SGMM effectively addresses endogeneity and model deficiencies, while also providing highly statistically significant estimates. Therefore, the analysis primarily focuses on the SGMM results.

4. RESEARCH RESULTS

Table 4.1. Descriptive statistics of variables

Variables	Observations	Mean	Std. dev	Minimum	Maximum
lnX/M	484	-0.2216571	0.5962588	-3.150158	0.9743926
lnX/M$_{(-1)}$	440	-0.2255465	0.6004627	-3.150158	0.9743926
TF	346	61.22158	21.74723	9.68	96.77
GLPI	473	0.482432	0.2273579	0.0192196	0.999057
OP	484	66.86261	20.36075	39.35543	97.94982
REER	462	126.3388	95.91321	50.0868	1797.455
lnGDP	484	25.26037	1.9915	21.05668	30.51488
lnFDI	430	21.31624	2.39083	13.57598	26.56413

Table 4.2. Correlation matrix and variance inflation factor (VIF)

Variables	lnX/M	lnX/M$_{(-1)}$	TF	GLPI	OP	REER	lnGDP	lnFDI	VIF	1/VIF
lnX/M	1.0									
lnX/M$_{(-1)}$	0.9372	1.0							1.84	0.543117
TF	0.5238	0.5147	1.0						2.69	0.371095
GLPI	0.3513	0.357	0.4338	1.0					1.4	0.712523
OP	0.057	0.0482	0.2537	0.0167	1.0				1.22	0.82245
REER	-0.128	-0.1121	-0.1065	-0.1162	0.0527	1.0			1.06	0.946338
lnGDP	0.4543	0.454	0.6327	0.3692	0.0226	0.0226	1.0		2.79	0.358515

lnFDI	0.5716	0.552	0.6593	0.4808	0.0164	0.0164	-0.1279	1.0	3.27	0.305815

The correlation matrix shows that the correlation between the variables in the model is relatively low (below 0.8), indicating that there is no multicollinearity present. Furthermore, when performing the VIF test, all coefficients are below 10, so the authors decided to retain the original model for further model selection.

Table 4.4. Regression results analysis

----	**POLS**	**FEM**	**REM**	**FGLS**	**GMM**
$lnX/M_{(-1)}$	0.890***	0.292***	0.890***	0.909***	0.700***
	[0.0203]	[0.0518]	[0.0203]	[0.0173]	[0.0210]
TF	0.00105*	-0.000114	0.00105*	0.000763**	0.00246***
	[0.00062]	[0.000858]	[0.00062]	[0.000311]	[0.00035]
GLPI	0.00286	-0.190	0.00286	-0.0174	0.0863**
	[0.0398]	[0.155]	[0.0398]	[0.0192]	[0.0426]
OP	0.0000825	0.000191	0.0000825	-0.000356*	-0.000277***
	[0.000497]	[0.000505]	[0.000497]	[0.000192]	[0.0000581]
REER	-0.0000593	-0.0000265	-0.0000593	-0.0000601*	0.000461***
	[0.0000673]	[0.0000756]	[0.0000673]	[0.0000312]	[0.0000743]
lnGDP	-0.0148***	0.0216	-0.0148**	-0.0113***	-0.0308***
	[0.00623]	[0.0485]	[0.00623]	[0.00298]	[0.00432]
lnFDI	0.0225***	0.00946	0.0225***	0.0152***	0.0381***
	[0.0056]	[0.00947]	[0.0056]	[0.00382]	[0.00205]
_cons	-0.206*	-0.854	-0.206*	-0.0692	-0.351***
	[0.121]	[1.217]	[0.121]	[0.0654]	[0.0649]
Số quan sát:	308	308	308	308	308
R-Square	0.932	0.121			

*** p<0,01, ** p<0,05, * p<0,1

The research results indicate that the balance of trade of Asian countries demonstrates high sustainability. This confirms that past balance of trade values significantly influence the current balance of trade. Specifically, a 1% increase in the previous period's balance of trade leads to a 0.7% increase in the current period's balance of trade at a 1% significance level, holding other factors constant.

According to the research findings, trade facilitation positively correlates with the balance of trade of Asian countries and territories at a 1% significance level. This result is consistent with prior studies by Alassane D. Yeo & Aimin Deng (2020) and Iwanow & Kirkpatrick (2007). In the context of digitalization and sustainable development, trade facilitation plays an increasingly important role in driving international trade growth. A 1% improvement in trade facilitation leads to a 0.246% increase in the balance of trade.

At a 5% significance level, the green logistics performance index (GLPI) has a statistically significant positive impact on the balance of trade. Specifically, a 1-unit increase in the GLPI raises the balance of trade by 8.63%, highlighting its important role in this research. This result is consistent with previous studies (Wang et al., 2018; Thu Hien Le et al., 2022).

Furthermore, the crude oil price (WTI) has a negative impact on the balance of trade of Asian countries at a 1% significance level, supporting Hypothesis H4. Specifically, a 1-unit increase in oil prices leads to a 0.0277% decrease in the balance of trade, holding other factors constant. This negative effect aligns with theoretical expectations and reality, where rising oil prices increase import costs, particularly for energy-importing countries, thus deteriorating the balance of trade.

Considering 65 major trading partners, the real effective exchange rate (REER) has a positive correlation with the balance of trade at a 1% significance level. A 1-unit increase in REER improves the balance of trade by 0.0461%. This result is similar to the findings of Myoung Shik Choi (2020) and Dilanchiev et al. (2022).

The research also shows that real GDP has a negative impact on the balance of trade at a 1% significance level, supporting Hypothesis H3. Specifically, a 1% increase in GDP leads to a 0.0308% decrease in the balance of trade, holding other factors constant. This negative effect aligns with theoretical expectations, where economic growth leads to higher national income, boosting import demand faster than export growth, thus worsening the balance of trade.

Finally, at a 1% significance level, foreign direct investment (FDI) positively correlates with the balance of trade. A 1% increase in FDI improves the balance of trade by 0.0381%, holding other factors constant. This result fully supports the hypothesis proposed by Adi Cristanto & Ari Bowo (2021), confirming that FDI enhances production capacity, improves export performance, and reduces import dependency.

5. CONCLUSION

Based on the research findings, the authors propose several policy recommendations to improve the trade balance and promote sustainable development in Asian economies. First, governments should invest in green logistics infrastructure, enhance trade digitalization, and simplify customs procedures to optimize supply chains. Additionally, screening foreign direct investment projects based on green standards, developing eco-industrial zones, and maintaining flexible exchange rate policies can strengthen trade competitiveness. Given the volatility of oil prices and geopolitical tensions, countries should also promote renewable energy adoption and support businesses in implementing energy-efficient technologies to mitigate transportation costs. Furthermore, fostering domestic production and export-oriented strategies will contribute to a more balanced trade structure.

While this study provides empirical evidence on the relationship between green logistics and trade balance in Asia, certain limitations remain. The dataset, covering 44 out of 51 countries from 2013 to 2023, requires further expansion and updates for greater representativeness. Moreover, the study does not account for variations in impact across different income groups, suggesting that future research should refine the analysis to develop more tailored policy recommendations for optimizing trade balance effectiveness.

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PROFIT-DRIVEN SPACE ALLOCATION IN SUPERMARKETS: COMPARING MILP AND HEURISTIC MODELS

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ABSTRACT

The optimal visibility of products and the movement of stock are guaranteed by effective shelf-space allocation. However, conventional methods frequently rely on intuition, resulting in suboptimal utilization. This study compares Mixed-Integer Linear Programming (MILP) and heuristic models, evaluating their effectiveness in profitability, computational feasibility, and scalability using real-world data from AEON Mall in Vietnam. The experimental findings demonstrate that MILP surpasses heuristics in profitability (2403.05 compared to 2004.33) and inventory turnover (0.6813 versus 0.31), illustrating its superiority in structured space allocation. Nevertheless, the computation time of MILP (2912s) is considerably longer than that of the heuristic model (1450s), rendering it less practical for real-time modifications. The heuristic model, despite a 16.59% reduction in accuracy, attains a 2.01× acceleration, providing a computationally economical option for frequent layout adjustments in dynamic retail settings. Limitations pertain to the use of a singular dataset and the reliance of heuristic efficacy on parameter optimization, potentially affecting reliability in extensive applications. Further studies should explore hybrid models that merge the accuracy of MILP with the adaptability of heuristics, assess scalability in extensive datasets, and incorporate consumer behavior dynamics, such as impulse purchases and store traffic patterns, to enhance practical efficacy.

Keywords: Computational Efficiency, Heuristics, Inventory Turnover, Mixed-Integer Linear Programming, Profitability, Supermarket Optimization.

1. INTRODUCTION

The distribution of supermarket space is essential for maximizing profitability, increasing stock turnover, and boosting operating efficiency. Intensified competition and changes in customer pREFERENCES have amplified the necessity for efficient store layouts that strategically arrange products to enhance sales and reduce inventory costs (Qin et al., 2022). Conventional shelf layout techniques, based on managerial intuition and empirical information, frequently neglect the dynamic aspects of customer purchasing behavior, which are affected by factors such as price sensitivity, impulsive buying, and shop traffic density (Flamand et al., 2016). Optimization models, including Mixed-Integer Linear Programming (MILP) and heuristic methods, provide systematic frameworks for tackling these challenges (Kim & Moon, 2021). MILP delivers mathematically optimal solutions by framing product placement as an optimization problem bounded by shelf space, sales data, and product attributes (Gul et al., 2022). However, its computational viability declines in extensive supermarkets as processing time increases exponentially with problem size (Zhou & Xu, 2018). In contrast, heuristic methods like simulated annealing produce near-optimal solutions with more efficiency, facilitating real-time decision-making in dynamic retail settings (Geraeli & Roghanian, 2024). This study evaluates the efficacy of MILP and simulated annealing in optimizing supermarket layouts, examining their influence on profitability and computational viability.

Despite their benefits, current optimization models encounter substantial constraints that impede practical implementation. Numerous MILP-based methodologies function under simplistic assumptions, regarding product dimensions and demand patterns as unchanging, unable to represent the realities of contemporary supermarkets (Barbosa Póvoa et al., 2021). Although these models may produce theoretically ideal solutions, they frequently neglect differences in shelf designs, changing consumer demand, and practical constraints. Moreover, MILP has restricted flexibility, rendering it inappropriate for supermarkets that necessitate regular layout modifications due to promotions, seasonal variations, or operational alterations (Pandey et al., 2021). While heuristic models, especially simulated annealing, have been investigated as alternatives, research seldom offers direct comparisons with MILP, favoring computing efficiency

above profitability effects (Sel et al., 2015). Moreover, many research presumes that supermarket layouts are static, neglecting the need for adaptive reconfigurations in response to market trends and changes in customer behavior (Zhou & Tan, 2019). Addressing these research deficiencies is crucial for formulating optimization strategies that correspond with actual supermarket operations, thereby ensuring both scalability and profitability in fluctuating retail environments.

This study examines the relative efficacy of MILP and heuristic optimization methods in enhancing store profitability while considering the solution accuracy and scalability in practice. The principal research questions directing this project are:

RQ1: How well do Mixed-Integer Linear Programming (MILP) and heuristic optimization methods increase profitability while remaining computationally feasible in retail settings?

RQ2: What are the principal trade-offs between MILP and simulated annealing regarding solution accuracy, profitability, and scalability?

In this study, MILP and simulated annealing are applied and compared for their effectiveness in optimizing supermarket space allocation decision concerning profitability, computational efficiency, and scalability in a large-scale retail environment. The research aims at identifying the dissimilarities between these models regarding the achievement of maximum supermarket revenue with reasonable computational cost. To this end, key performance metrics such as computational runtime, profitability outcomes, inventory turnover and scalability assessment will be analyzed to compare both approaches.

Finally, the remainder of this paper is structured as follows. Section 2 presents the literature review, summarizing existing research on application of MILP and heuristic models while identifying research gaps. Section 3 outlines the development of proposed models and evaluation criteria. Section 4 presents empirical results, setting the foundation to provide managerial implications. Finally, the paper concludes the study by delineating the limitations and proposing directions for future research.

2. LITERATURE REVIEW

2.1. Supermarket Space Optimization

Supermarket space optimization is a vital factor in profitability, affecting operational efficiency and consumer spending patterns. Theoretical frameworks for space allocation originate mostly from traditional inventory management and consumer behavior theories, highlighting the significance of product visibility, demand elasticity, and strategic positioning in enhancing sales (Gecili & Parikh, 2022). Early research in retail optimization concentrated on heuristic decision-making, wherein store managers utilized empirical knowledge to organize product layouts. Nonetheless, advancements in computational techniques have enabled mathematical optimization models, including Mixed-Integer Linear Programming (MILP) and heuristics, to offer formal frameworks for the systematic enhancement of space utilization (Fasano & Pintér, 2012).

MILP models conceptualize supermarket layout planning as an optimization problem limited by shelf space, product demand, and customer behavior. These models theoretically rely on the principles of linear programming and combinatorial optimization, providing precise answers when computing feasibility allows (Belov et al., 2016). Conversely, heuristic-based methods like simulated annealing utilize probabilistic principles to progressively improve layouts, albeit without ensuring global optimality. The disparity between these two methodologies underscores a basic trade-off between accuracy and flexibility, establishing the foundation for empirical evaluations in the next sections.

MILP has been a prevalent approach in optimizing supermarket space, especially in extensive retail chains where the intricacy of product placements requires systematic decision-making. MILP-based models have demonstrated significant effectiveness in optimizing shelf-space allocation, with studies showing profit increases of up to 16.56% through improved product facings and space utilization (Gencosman & Begen, 2021). These models efficiently handle large-scale retail environments, as evidenced by their ability to optimize up to 800 product categories across 100 shelves while maintaining near-optimal computation times (Flamand et al., 2017). Moreover, by incorporating factors such as product positioning, elasticity, and cross-space effects, MILP provides a structured framework for maximizing sales and impulse purchases (Kim & Moon, 2021).

The principal advantage of MILP is its capacity to impose stringent limits, guaranteeing that space allocation complies with established company regulations, including brand positioning criteria and inventory management procedures (Cevikcan et al., 2019). MILP models enable multi-objective optimization, reconciling profitability with considerations like product visibility and shopper convenience. Given these advantages, computing limitations persist as a considerable obstacle. Research demonstrates that addressing MILP problems for large-scale supermarkets necessitates substantial computer resources, with solution times escalating exponentially as the quantity of choice factors increases (Xu & Cao, 2019). However, despite its success, the computational intensity of MILP models, particularly those relying on piecewise linearization, poses challenges for real-time adaptability in dynamic retail environments (Irion et al., 2012). Additionally, while these models excel at structured constraints, they still require further refinement to fully integrate unstructured consumer behaviors, such as impulse buying patterns (Flamand et al., 2017).

2.2. Heuristic Approaches in Retail Optimization

Heuristic approaches have become increasingly popular as viable substitutes for MILP, especially in large-scale and computationally demanding retail optimization challenges. Simulated annealing has been extensively utilized in supermarket layout planning because of its capacity to rapidly navigate complex search spaces while circumventing local optima (Fathi et al., 2020). In contrast to MILP, which ensures precise solutions within established restrictions, simulated annealing is an iterative methodology that probabilistically embraces poor solutions to improve long-term optimization.

Empirical research indicates that simulated annealing can attain near-optimal solutions while substantially decreasing computing time. In a comparison analysis of MILP and heuristic models, simulated annealing solutions achieved optimal revenue configurations within 5% while decreasing computing time by over 80% (Gholizadeh et al., 2021). This efficiency enhancement renders heuristic models especially appropriate for supermarkets that necessitate regular layout modifications in reaction to evolving consumer pREFERENCES and advertising initiatives. While simulated annealing provides a strong balance between computational efficiency and solution quality, reducing computing time significantly compared to traditional MILP models (Hasan et al., 2000), its performance can be sensitive to parameter tuning and cooling schedules, limiting its adaptability in dynamic retail environments (Wang & Jin, 2000)

Despite their efficiency, heuristic models often struggle with constraint adherence, requiring additional adjustments compared to MILP (Chen & Shahandashti, 2009). Their performance is also highly dependent on parameter tuning, which can lead to suboptimal solutions if not carefully optimized (Fatyanosa et al., 2017). These limitations highlight the need for hybrid approaches that integrate heuristics with mathematical optimization for greater accuracy and efficiency (Drain et al., 2004).

2.3. Research gaps

Contemporary research on supermarket space optimization has limitations in empirical assessments of MILP and heuristic models under actual retail conditions. Although MILP provides optimal shelf-space allocation, its computational demands hinder scalability, making it less viable for large supermarkets (Camisa et al., 2022). On the other hand, heuristic models can enhance speed but frequently overlook the trade-offs between accuracy and profitability (Pryshlakivsky & Searcy, 2015). Moreover, supermarket layouts are generally designed as static, overlooking the periodic reconfigurations in response to shifting demand and promotional activities (Ozgormus & Smith, 2020). Therefore, the lack of direct comparative analyses between MILP and heuristic models in profitability, inventory turnover, and scalability further limits a comprehensive understanding of their trade-offs in large-scale supermarket optimization.

3. METHODOLOGY

3.1. Research Design

The research framework is organized into three key phases: data preparation, modeling, and evaluation (Figure 1). Data preparation includes collecting data and parameters initialization while modeling involves executing MILP and Heuristic model. Finally, the performance of two models is evaluated based on three main criteria, namely Accuracy, Efficiency, and Scalability.

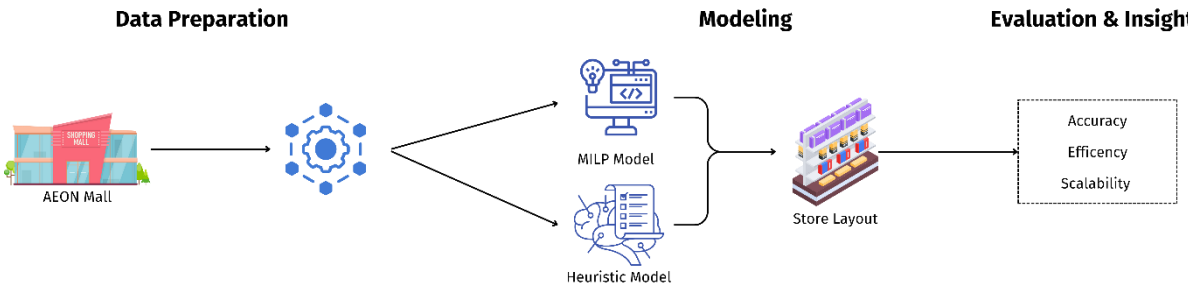


Figure 12. Research Framework

3.2. Data Preparation

A dataset comprising 532 products and 13 their features was utilized, representing product attributes, shelf structures, and inventory turnover metrics from AEON mall in Vietnam. This data, sourced from open-access repositories, ensured transparency and reproducibility. Then, a Linear Programming (LP) model was developed to optimize shelf space allocation, focusing on the decision variable 'facings' - the number of product units displayed on the shelf. This variable was constrained to integer values with a lower bound of zero, reflecting practical display scenarios. Several constraints are considered as presented in Table 1.

Table 2. Model Constraints

Constraint Category	Description	Mathematical Formulation	REFERENCES
Shelf Space Constraints	The total width occupied by products must not exceed the availabe shelf width	$\sum_i (f_i \times w_i) \leq W$	(Czerniachowska, 2021; Gencosman & Begen, 2021)
	The total height occupied by products must not exceed the availabe shelf height	$\sum_i (f_i \times h_i) \leq H$	
	The total depth occupied by products must not exceed the availabe shelf depth	$\sum_i (f_i \times d_i) \leq D$	
Facing constraint	Each product must have at least its number of facing and cannot exceed its maximum number of facing	$f_{min,i} \leq f_i \leq f_{max,i}$	(Flamand et al., 2018; Hansen & Heinsbroek, 1979)

3.3. Modeling

3.3.1. MILP

The MILP model formulates shelf allocation as a profit-maximization problem, constrained by shelf dimensions, product facings, and restocking schedules (Kim & Moon, 2021). The objective function (Equation 1), defined as maximizing total revenue based on unit margins and facings per product, ensures that high-margin and high-demand products receive optimal visibility.

$$\max \sum_i (f_i \times m_i) \quad (1)$$

where f_i is the number of facings for product i, and m_i represents the profit margin per unit.

The COIN-OR Branch and Cut (CBC) solver processes the MILP model, efficiently computing optimal allocations despite large-scale product datasets (Scavuzzo et al., 2024). It first relaxes integer constraints, solves the problem as a Linear Programming (LP) relaxation, and applies Branch-and-Bound and Cutting Plane methods to enforce integer solution.

3.3.2. Balanced Clustering

The Balanced Clustering approach optimizes store layout by grouping similar products while ensuring even distribution across the store section (Vogel et al., 2021). This approach uses Euclidean distance, calculated as:

$$d(i,j) = \sqrt{\sum_{k=1}^{n} (x_{ik} - x_{jk})^2} \quad (2)$$

where $d(i,j)$ represents the distance between products i and j, and x_{ik}, x_{jk} denote their feature values. Besides, the clustering model minimizes intra-cluster distances through a linear programming-based assignment process, ensuring that each store section remains balanced and enhances customer shopping patterns (Balakrishnan et al., 2018). The objective function of this process:

$$\min \sum_{k=1}^{K} \sum_{i,j \in C_k} d(i,j) \quad (3)$$

where K is the number of store sections, and C_k is the set of products in each cluster.

Store section labels are then integrated into the dataset, aligning clustering results with the MILP-based shelf allocation model to enhance store navigation, product accessibility, and profitability (Table 2).

Table 3. MILP Framework Result

product_id	category_id	brand_id	facings	level	total_margin
104658	136	355	1	1	6.8374
113776	136	83	1	1	8.7011
116570	136	53	3	1	6.4863
106808	136	83	1	1	4.7059
101082	137	355	1	5	5.4394
102195	137	355	1	5	12.2250
103031	137	885	2	5	5.8813
101129	137	402	1	5	10.5077

3.4. Heuristic

Simulated Annealing improves shelf allocation by examining various product configurations and progressively approaching an optimal solution (S. Beed et al., 2020). The method begins with a random shelf arrangement, progressively adjusting facings while using an acceptance probability function that allows a temporary acceptance of less effective designs. The method starts with an initial score, indicating overall profit contribution:

$$\text{current_score} = \sum_i \text{unit_margin}[i] \quad (4)$$

where unit_margin[i] denotes the profit contribution of product i. The algorithm accepts new solutions probabilistically, defined by Metropolis criteria (Franzin & Stützle, 2018)

$$P = e^{\frac{\text{new_score} - \text{curent_score}}{\text{temparature}}} \quad (5)$$

This criteria allows temporary acceptance of suboptimal solutions. The cooling function follows:

$$\text{temperature} = \text{temperature} \times \text{cooling rate} \quad (6)$$

This modeling approach aims to strike an effective balance between solution accuracy and computational efficiency, particularly in the context of optimizing shelf configurations for large-scale product assortments. The initial temperature is set at 1000, which enables the algorithm to explore a wide range of configurations in the early phases, reducing the risk of premature convergence. A cooling rate of 0.99 is applied to ensure that temperature decreases gradually, allowing the algorithm to retain solution diversity across iterations while progressively narrowing its search toward high-quality outcomes. Additionally, the process is governed by a fixed iteration limit of 1000, which defines the total number of optimization steps and maintains computational control. Together, these parameter settings reflect a deliberate trade-off, offering sufficient exploratory depth while ensuring that the algorithm remains computationally feasible for practical application in real-world supermarket environments.

3.5. Evaluation Metrics

In providing a critical perspective on the trade-offs between two approaches, profitability, inventory efficiency, accuracy, computational efficiency, and scalability measurements are considered to ensure a comprehensive comparison.

3.5.1. Profitability

Profit Margin: Assesses the percentage of profit relative to total revenue, indicating how effectively the optimization model maximizes financial performance. It is calculated as:

$$\text{Profit Margin (\%)} = \left(\frac{\text{Total Profit}}{\text{Total Revenue}}\right) \times 100 \quad (7)$$

A higher profit margin reflects more effective space allocation strategies that generate higher financial returns.

Inventory Turnover Rate: Measures how frequently inventory is replenished. A higher rate suggests better space utilization and reduces holding costs. The formula expresses as:

$$\text{Turnover Rate} = \frac{\text{Total Sales Volume}}{\text{Average Inventory Level}} \quad (8)$$

Accuracy Loss: Quantifies the deviation of heuristic results from the MILP benchmark, where lower values indicate closer alignment with the optimal solution. MILP, as an exact optimization method, has no accuracy loss.

$$\text{Accuracy Loss (\%)} = \left(\frac{\text{Optimal Profit} - \text{Heuristic Profit}}{\text{Optimal Profit}}\right) \times 100 \quad (9)$$

3.5.2. Efficiency

Computation Time: Represents the time required for each model to generate an optimized layout.

$$\text{Computation Time} = t_{end} - t_{start} \quad (10)$$

Where t_{start} and t_{end} denote the start and completion times of the optimization process, in which lower values indicate greater efficiency.

3.5.3. Scalability

Speedup Factor: Compares the computational efficiency of heuristics relative to MILP. A higher speedup factor indicates that the heuristic model delivers results in significantly less time.

$$\text{Speedup Factor} = \frac{\text{MILP Computation Time}}{\text{Heuristic Computation Time}} \quad (11)$$

4. Results And Discussion

4.1. Experimental Result

Table 4. Experimental Result

Metrics	MILP	Heuristic
Profit Margin	2403.0458	2004.3253
Inventory Turnover Rate	0.6813	0.3100
Computation Time	2912	1450
Accuracy Loss	0	16.5923
Speedup Factor	2.0080	1

The experimental results (Table 3) highlight a trade-off between accuracy and computational efficiency in supermarket space optimization. MILP achieves a higher profit margin (2403.0458 vs. 2004.3253) and inventory turnover rate (0.6813 vs. 0.31), confirming its ability to optimize shelf space effectively. However, its longer computation time (2912s vs. 1450s) indicates a scalability challenge. The heuristic model, despite a 16.59% accuracy loss, significantly reduces computation time, achieving a 2.01× speedup factor over MILP. These findings suggest that MILP is ideal for maximizing profitability, whereas heuristics offer a computationally efficient alternative for dynamic retail environments.

4.2. Discussion

The results demonstrate a clear trade-off between optimization accuracy and computational efficiency. MILP achieves a higher profit margin (2403.05 vs. 2004.33) and better inventory turnover (0.6813 vs. 0.31), confirming its effectiveness in maximizing revenue and stock movement. However, its longer computation time (2912s vs. 1450s) presents a scalability challenge, limiting its feasibility for frequent layout adjustments. The heuristic model, despite a 16.59% accuracy loss, provides a 2.01× speedup factor, offering a more computationally efficient alternative. These findings indicate that MILP is better suited for long-term strategic planning, while heuristics enable faster real-time decision-making in dynamic retail settings.

4.3. Managerial Implications

Retailers must balance profitability and computational efficiency when selecting an optimization model. MILP is ideal for maximizing revenue and optimizing shelf-space utilization, making it suitable for large-scale, long-term layout planning where computation time is not a constraint. However, in dynamic retail environments requiring frequent reconfigurations, heuristics provide faster solutions, making them more practical for real-time retail adjustments, promotions, and seasonal shifts, benefiting FMCG retailers and convenience stores.

The findings also support a hybrid approach, using MILP for an optimal store layout and heuristics for ongoing layout modifications, ensuring flexibility without excessive computational costs. This insight aids retailers and supply chain managers in selecting the most effective space optimization strategy based on store size, inventory dynamics and market condition, achieving both accuracy and adaptability in supermarket space management.

5. CONCLUSION

This study examines MILP and heuristic models for supermarket space optimization, revealing a trade-off between accuracy and computational efficiency. Although MILP enhances profitability and inventory turnover, its real-time applicability is restricted by the substantial computation time required. In contrast, heuristics, despite a 16.59% accuracy loss, offer a 2.01× speedup, making them a more practical choice for frequent layout adjustments in dynamic retail environments.

However, the study relies on a single dataset, potentially limiting scalability insights, and heuristic performance depends on parameter tuning, affecting solution quality. Additionally, consumer purchasing behaviors and demand fluctuations are not accounted for, which could impact optimization outcomes.

Future research should focus on the development of hybrid optimization models that incorporate heuristic methods for real-time adjustments and leverage MILP for initial store layout planning. This approach will ensure a balance between computational efficiency and accurate solutions. The scalability trends across a variety of product categories and store sizes should be analyzed in solution time growth to identify computational constraints in large-scale retail environments. Furthermore, the integration of consumer behavior analytics, including impulse purchasing tendencies, traffic flow patterns, and promotional influences, into optimization frameworks could improve decision-making, thereby enhancing the adaptability of models to dynamic market conditions and fluctuating demand patterns.

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A DIGITAL GAME-BASED RHIZOMATIC LEARNING SYSTEM TO IMPROVE LISTENING COMPREHENSION FOR A1 LEARNERS

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ABSTRACT

Listening comprehension is widely recognized as one of the most challenging skills for English as a Foreign Language (EFL) learners, particularly for those at the A1 proficiency level according to the Common European Framework of Reference for Languages (CEFR). This paper purports to propose a digital game-based rhizomatic learning system to improve listening comprehension for A1 learners. The system is designed based on the principles of rhizomatic learning approach (Lian, 2004) which emphasizes non-linear, self-directed knowledge exploration and interconnected learning experiences. Additionally, digital game-based learning (DGBL) features are integrated into the system to provide interactive, immersive, and gamified learning experiences that promote engagement and motivation. The application design is also described to illustrate the game. This learning system is expected to contribute to improving students' listening comprehension skills, increasing their motivation to engage with listening tasks, and fostering greater autonomy in language learning.

Keywords: A1 learners; Digital game-based learning; Listening comprehension; Rhizomatic learning

1. CONTEXT

The target learners of this learning system are students at A1 level. According to Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2001, p.24), students with A1 level "*can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type; can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has; can interact in a simple way provided the other person talks slowly and clearly and is prepared to help*."

This learning system aims at developing students' listening comprehension at least from A1 level to A2 level. The description of A2 level is that students *"can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment); can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters; can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need; can catch the main point in short, clear, simple messages and announcements.*"(Council of Europe, 2001, p.24)

As can be seen from these descriptions, the difference of these levels is learners' ability to understand and use English in various contexts. For A2 level, the contexts seem to be more complex than those of A1 level.

2. INTELLECTUAL FRAMEWORK

2.1 Definition of listening

Brown (2017) defines listening as the ability of a person to understand what other people say including their accent, pronunciation, grammar, vocabulary and meaning. According to Newton and Nation (2020), listening is a process of receiving what the speaker says, making and showing meaning, negotiating meaning with the speaker and answering, and creating meaning by participation, creativity, and empathy. Similarly, Lynch and Mendelsohn (2013) state that listening is the process when the listener gets, makes meaning and respond to the signals. It is the act of comparing what they can hear and what they have in their mind. Listening plays an important role in helping us understand the events around and it is an indispensable factor contributing to the success of communication (Gilakjani & Ahmadi, 2011).

2.2 Definition of listening comprehension

With regard to listening comprehension, Brown (2017) posits that listening comprehension is when a person understands the sound they have heard. Meanwhile, it is defined by Hamouda (2013) as an interactive process of meaning construction of listeners in which a person comprehends spoken input through sound discrimination, previous knowledge, grammatical structures, stress and intonation, and the other linguistic or non-linguistic clues. Similarly, Nadig (2021) demonstrates that listening comprehension is the process of making sense of oral messages by understanding sounds, meanings of words and grammar.

2.3 Listening comprehension model

This project utilizes the listening comprehension model of Anderson (1995) which divides this process into three dimensions: Perception, Parsing and Utilization (Figure 1). The first phase "Perception" happens when the listener employs bottom-up processing to store the sound categories in the memory after recognizing them. After that, a decoding process takes place when the listener filters the sounds and compares them with pauses, acoustic emphases of a particular language. At the end, a phonetic representation is developed for parsing. In the second phase "Parsing", the listener will parse the phonetic representation of what is in the memories and utilize parsed speech to take word candidates in the long-term memories. The ability of activating word candidates related to a topic and context depends on the proficiency. The final phase is "Utilization" in which the listener connects meaningful units to the information stored in the long-term memory (pragmatic and prior knowledge) for the interpretation. Top-down processing happens in this phase.

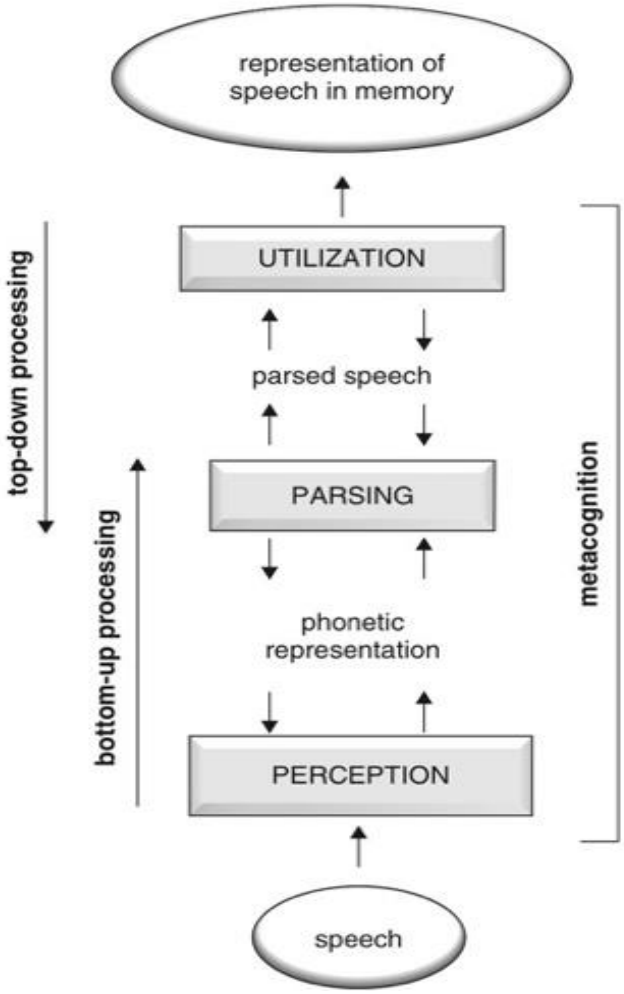


Figure 1. Cognitive Processes and Knowledge Sources in Listening Comprehension (Anderson, 1995)

2.4 Rhizomatic learning approach

Rhizomatic approach by Lian (2004) is employed as the main framework to develop the learning system to enhance A1 learners' listening comprehension.

2.4.1 Rhizomatic approach

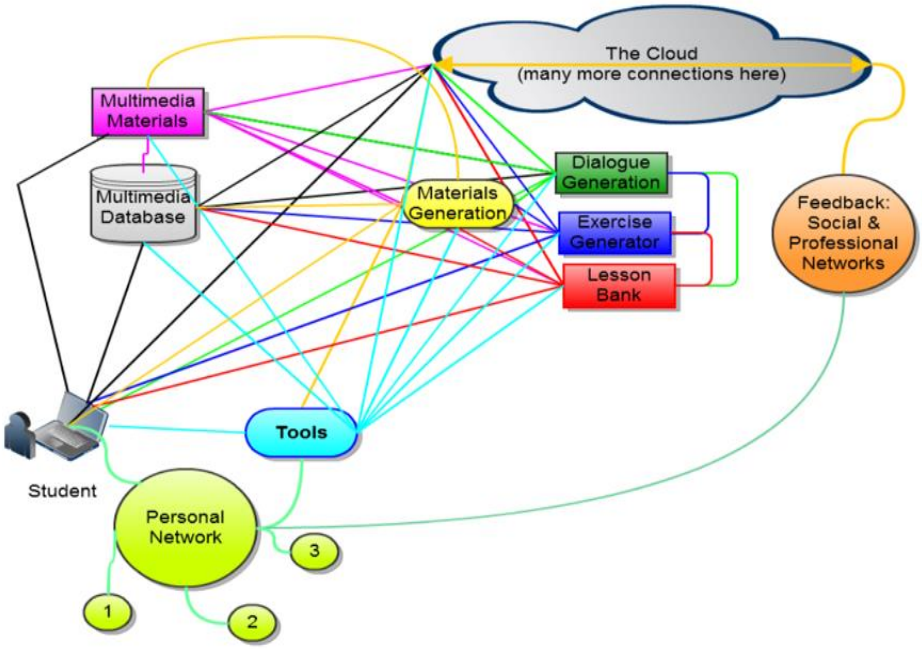


Figure 2. A rhizomatic learning environment for foreign culture/language learning (Lian, 2004)

According to Lian (2004, p.2), rhizomatic structure offers an "*unpredicted and unpredictable sequencing of events*" rather than a structured "*network of knowledge representation nodes*". The nodes in this sequence are connected with each other and are decided by students' needs. This means that with this structure, students can make connection among different activities or information points. All the activities and connections will be identified and modified from corrective feedback and emergent connections will appear to meet their needs (Figure 2).

2.4.2 Principles

The main principle of this framework is that learning happens when we generate meanings. In our life, we need to continuously make meanings from signals to respond to every moment and context. Minsky (1981, as cited in Lian, 2004) states that meaning making is made by each individual under their personal representational and logical systems constructed from their operational history. Our perception is the process of filtering our past through these systems which enable us to make sense of the world but also cause the limitation of our understanding. Learning is an act of comprehension which challenges the learner's personal representational and logical systems. In order to comprehend, individuals need to confront, contrast and contest against the complexity of events happening around them (Lian, 2004). According to him, learning experience should be complex and authentic contexts need to be provided so that students are able to investigate using proper tools and feedback mechanisms. Language learners not only learn language literally but also many other aspects that are unknown, invisible, uncategorized, unpredicted and unpredictable. In conclusion, it is essential that learning systems provide individuals opportunities to have collisions in their internal understanding systems.

2.4.3 Activity space

From aforementioned principles, there are several characteristics of an effective learning environment. Firstly, complex authentic tasks should be designed to facilitate learners' collisions to happen between their logical and representational systems. Learners' understandings, reproduction, replication are required through the tasks which afford them various problems to solve. In addition, this environment allows learners of different proficiencies to learn personally and contribute appropriately. Last but not least, mechanisms to support learners' needs should be available with relevant linguistic components as well as audiovisual and software assistance (Lian, 2004).

2.4.4 Software tools

With regard to software tools to satisfy learner's needs, Lian (2004) said that there are not many resources that can do it. He lists some general features for these kinds of tools. The first thing is that they are connected and related to each other to maximize the flexibility, portability and individual use. Learners are able to confront, contrast and contest their

comprehension towards phenomena by feedback given. In other words, these tools enhance their understandings, raise their awareness and improve their critical thinking. Learners can access any information according to their perceived demand by clicking on optional buttons or words/ phrases. It is learners who control their learning process autonomously. There should also be some types of automatic feedback, tools to raise awareness. Finally, it is important to be able to connect these tools with Web-based data base management systems (Lian, 2004).

2.5 Digital game-based learning

Digital game-based learning (DGBL) is defined as the utilization of computer games or various game applications for learning and educational purposes (Videnovik et al., 2023). Zou et al. (2021) summarizes five game mechanics commonly used in game-based learning, which are:

- Goals/ Rules: a clear explanation about goals and how to play/ learn
- Mystery/ Fantasy: an exciting and engaging storyline for playing/learning
- Interactivity/ Feedback: the interaction with other learners/ players
- Competitions/ Contests: learners/ players endeavor to beat the others
- Rewards/ Points: learners/ players get rewards or points for their excellent performance

In ELT, DGBL is described as a teaching and learning technique that aims to assist students grasp language competencies while also developing extra skills (Hwang & Chen, 2022). According to Assapun and Thummaphan (2023), this method has the potential to broaden EFL teaching and learning experiences by incorporating online and offline tasks that are tailored to students' learning patterns. Ghazy et al. (2021) discovers that DGBL allows teachers to provide students with more feedback and flexible options to improve in their EFL education than in a traditional class. Kucher (2021) states that a DGBL environment should offer learners opportunities for autonomous choices.

3. LEARNING SPACE

The learning space in this system is a virtual simulation in a game-based environment using principles of global simulation approach. Global simulation (GS) was initially used as a framework for teaching French as a first language and then has become prevalent in other language education such EFL/ESL, German, Russian and so on (Michelson & Dupuy, 2014). With this approach, learners will take roles of imagined characters for the entire duration of a course. In other words, the duration for tasks is not fixed. They will take part in fictitious but culturally grounded world pertaining particular contexts such as hotel, hospital, apartment building… Learners perform their roles, and plan to perform the unplanned tasks by themselves.

4. APPLICATION DESIGN

The design of the game is grounded in Anderson's (1995) model of Cognitive Processes and Knowledge Sources in Listening Comprehension and Lian's (2004) approach of a rhizomatic learning environment. Learners are immersed in unpredictable, real-world listening scenarios without advance organizers, compelling them to rely on real-time processing and prior knowledge - just as in authentic communication. Meanwhile, the game's non-linear structure, where learners randomly select tasks from various city locations. This allows learners to navigate their own pathways, encounter diverse cultural and linguistic input, and construct meaning through exploration rather than fixed progression.

4.1. Tools

For this system, learners will play this game on mobile phone as most students have their own mobile phones, and it is convenient for them to play games anytime and anywhere. In addition, the Internet is needed because their performance will be recorded to be ranked. Learners can see how well they can play compared with their peers. Headphones are certainly important since this is the game for listening comprehension. Learners also feel more motivated with the background noise.

4.2. Background of the game

Since the ultimate outcome of A2 level is that learners "can understand sentences and frequently used expressions related to areas of most immediate relevance, for example shopping, local geography, employment…" (Council of Europe, 2001, p.24). This game aims at creating authentic contexts which are real-life situations at various locations in a

city such as shops, hospitals, restaurants, hotels, airports, universities, offices (interviews) and so on. The conversations happening in each context will be as natural as possible with commonly used expressions in daily life. This enables learners to practice listening to authentic materials and therefore can enhance their listening comprehension. As a result, after playing this game, A1 learners are supposed to be able to reach A2 level of listening comprehension. The name of the game is Alice in The Wonder City inspired from a well-known film Alice in The Wonderland. (Figure 3)



Figure 3. Alice In the Wonder City

4.3 Rules of the game



Figure 4. Pinpoints of the game

There will be pinpoints corresponding with different contexts at different locations which are also challenges learners need to accomplish. Learners will choose these pinpoints randomly, which means they do not know what they are listening. This minimizes advance organizers which limit learners' ability to predict (Figure 4). Each player has 100 coins to play this game at the beginning, they will have to overcome all challenges. Players will get more coins for any times they give the right answers but lose coins when they have wrong answers or use the assistance. At the end of the game, the system will look at the coins each person gets and the time s/he spent on completing the game to rank them from the highest to the lowest results. The ideal length to complete each pinpoint is around 10 minutes but learners might ask for further time if needed. The recommended total gameplay time is 30 -45 minutes per session. This duration supports sustained focus and offers exposure to 3-4 varied contexts.

4.4. An example of one pinpoint

In order to illustrate the game, the following example describes a challenge learners need to overcome, which happens at the shop.

First, players click on any pinpoints and one challenge will appear under a conversation between Alice and her mother, players now take the role of Alice. Before listening, players can choose the accent they prefer, and they think they can be most successful with it (Figure 5).

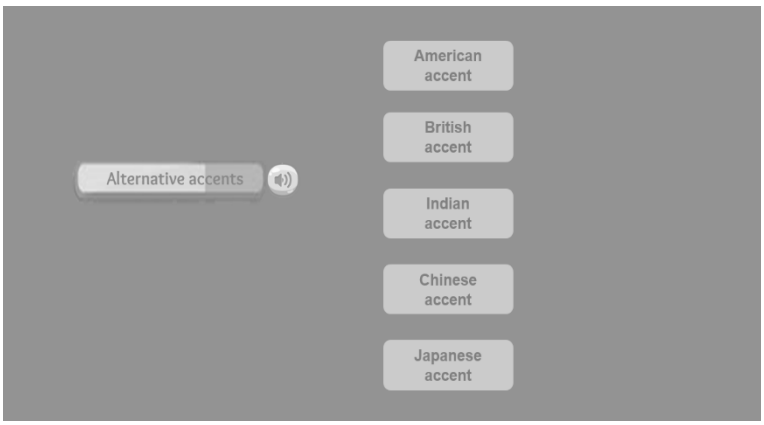


Figure 5. Alternative accents

In this example, the challenge that players have to accomplish is buying something from the shop at the market. In order to know what to buy, they need to listen and understand the audio. They can listen many times until they comprehend (Figure 6).



Figure 6. The first interface

In case they cannot understand after listening to it over and over a time, they can click on the button “Transcript” to get support, the transcript will show up. However, if they use this support, they will lose 5 coins (Figure 7).



Figure 7. Transcript

Another thing that players need to be sure is “those stuff” for Chinese New Year ceremony. If they know what to buy for this ceremony, they can go straight to the market by clicking “Play”. Otherwise, they can click on “Festival” to listen many times and identify the things they need to buy.

After listening, if players are clear, they can go to buy this stuff by clicking “Play”. If they are unclear, they can click on “Check Items”. This button allows them to type the items they guess from the audio. If their guesses are correct, they will not lose any coins otherwise they will lose 5 coins (Figure 8,9).



Figure 8. Check Items

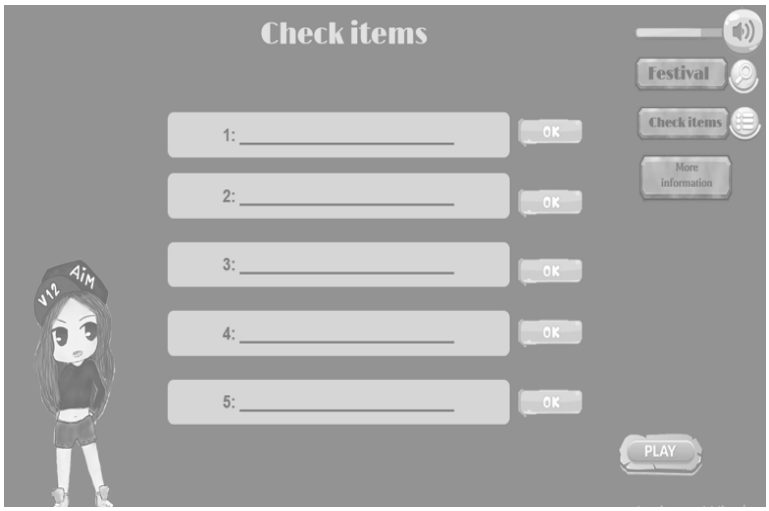


Figure 9. Check Items

In addition, if players are curious about this festival, they can click “More information”. This button is connected to a Youtube link about Lunar New Year (Figure 10).



Figure 10. Youtube link

When they are ready, they will click “Play” and then try to find the right place to buy necessary items. It is the players that decide where to go to get what they want. With this example, they should go to the market. That is the reason why they need to hear the advertisements when they click on each location to predict whether they can buy things there. For example, they might listen to an advertisement like this (Figure 11).



Figure 11. Advertisement

They will click "Play" when they find out the right place. For example, they can identify the market to buy some fruits.

There are 3 tasks corresponding with 3 common situations happening at the shop: Buying, Bargaining, Paying. However, on the interface, the players just see "Task 1, Task 2, Task 3". This is to avoid giving them advance organizers and certainly they will not know what they are going to listen (Figure 12).



Figure 12. At the shop

First, they will click "Task 1" and hear the sound from the seller "Hello. What would you like to buy?". After that they will hear the answer from Alice but under low pass filtering sound to raise their awareness. What they have to do is to write down exactly what they hear. If they can give the correct answer, they will get 10 coins. If they cannot know the answer they will click on "Hint" to get support (Figure 13).

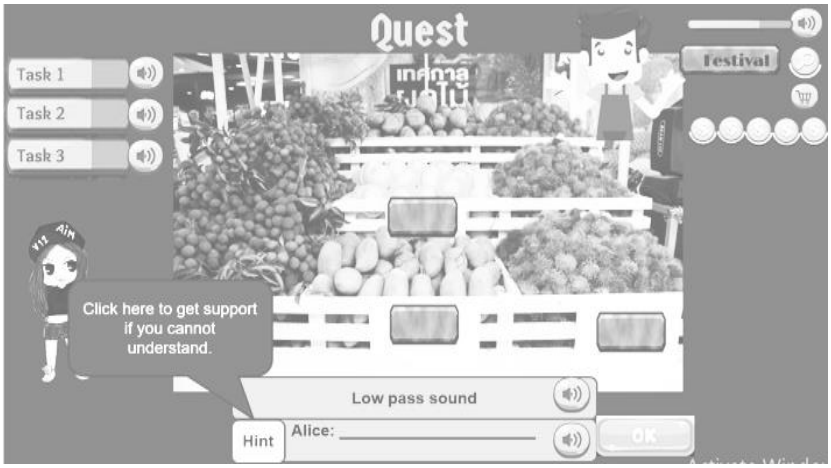


Figure 13. Task 1

There are three levels of "Hint" corresponding with the number of coins they might lose. Specifically, the first level with the number of letters for each word, players only lose 1 coin to use it. For the second level, they can see the first letter of each word and they lose 2 coins for that. The third level will be the easiest one with the first and the last letter appear, and the players lose 3 coins if they pick it (Figure 14).



Figure 14. 3 Hints

For any times they try, there will be automatic feedback provided (Figure 15).

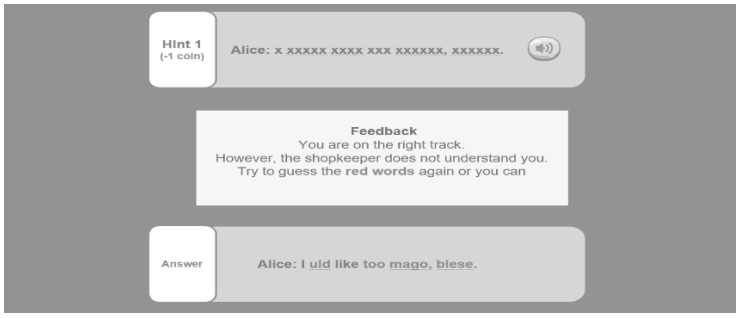


Figure 15. Feedback

The number of times they can hear is unlimited for each option which means they only use the other supports when they are really stuck. In addition, after they give correct answers, they can click "More information" to have more understandings about when and how they use these expressions (Figure 16). After they are successful with this task, the item will be in the basket, and they will move to task 2 and task 3 with the same procedure.

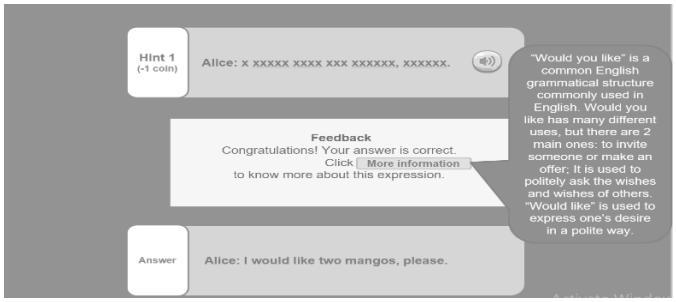


Figure 16. More information

At the end of this challenge, players will know how many coins they get. These coins will be used to overcome the next challenges in other locations (Figure 17).



Figure 17. The end

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NAVIGATING E-LEARNING IN TERTIARY EDUCATION: A MIXED-METHODS STUDY OF STUDENTS' PERCEPTIONS

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ABSTRACT

Thanks to the revolutionary emergence of technology, education has been transformed from traditional teaching methods to the phenomenal development of e-learning. This study was conducted with the aim of digging into English-major undergraduates' perceptions of the implementation of e-learning lessons regarding usability, self-efficacy, and enjoyment; from that, drew out the challenges that they faced and several proposed solutions to enhance the quality of this teaching and learning method. Mixed-methods research was employed to gain a comprehensive understanding of students' experiences. The findings were drawn from responses of 129 final-year students majoring in English Language at a university in southern Vietnam. The primary research instrument was a questionnaire comprising both Likert-scale and open-ended questions. The results revealed that university students generally held a positive attitude toward and were satisfied with e-learning implementation. However, they also faced several challenges, including Learning Management System (LMS) performance issues, difficulties in submitting assignments, and unstable internet connections. This study recommended solutions such as improving LMS performance speed, providing timely technical assistance, and organizing e-learning training seminars to enhance students' experiences.

Keywords: e-learning, enjoyment, LMS, self-efficacy, usability

1. INTRODUCTION

Technological advances have had significant impacts on educational transformation worldwide (Naikoo et al., 2020). The cutting-edge technology innovations not only have brought considerable possibilities and fundamental enhancement to numerous schools' systems but also have carried great benefits to teachers and students (Timotheou et al., 2023). For instance, technology enhances student's motivation and engagement due to fun game-like activities (Riasati et al., 2012). Another example is that teachers can reduce the burden of grading each student's test, as technological tools now handle accurate and timely assessments (Abed, 2019). In addition, Raja and Nagasubramani (2018) state that technology has made the teaching and learning process more pleasant with plenty of technological developments and eased geographical limitations with globalization. These significant changes have reshaped the teaching and learning methods to create more flexible, interactive, and personalized environments. It is undeniable that the nature of education has been transformed from a fixed, teacher-centered model to a vigorous approach (Djibran & Subiyanto, 2024).

Modern technology has triggered e-learning practices to progress powerfully and significantly (Kahiigi et al., 2008). In particular, e-learning means applying technological tools to enhance the quality of teaching and learning by facilitating administrations to online resources and promoting collaboration (Alonso et al., 2005). Compared to traditional learning, e-learning brings learners more freedom since they can study anytime and anywhere without attending lectures at a specific institution (Ahmed, 2022). Moreover, e-learning learners (e-learners) tend to have academic and practice performance better than those who study with traditional methods, as E-learners can satisfactorily revise and enjoy the learning process with the help of technological tools (Elfaki et al., 2019). E-learning provides flexibility, accessibility, and cost-effectiveness, offering students opportunities for self-paced learning and access to diverse educational resources (Dhawan, 2020). Despite its advantages, previous researchers find that students face several challenges in taking e-learning courses, such as engagement, digital literacy, technical infrastructure, and instructional quality (Almaiah et al., 2020).

Previous studies have focused on e-learning from various perspectives, including faculty preparedness, instructional design, and technological advancements (San-Martín et al., 2020). However, these studies mainly focused on discovering students' perceptions of the e-learning implementation (Al-Fraihat et al., 2020; Odekeye et al., 2023). There is a limited

number of studies figuring out the perceived challenges that students often face during the e-learning course and their suggested solutions for a better e-learning course. Therefore, there is a need for a mixed-methods study of this topic to provide a more holistic understanding of how students perceive and experience e-learning in tertiary education. This study aims to explore English-major undergraduates' perceptions of e-learning implementation, focusing on usability, self-efficacy, and enjoyment. Additionally, it identifies key challenges and proposes solutions to enhance the effectiveness of this teaching and learning method.

Research Questions

To attain the goals above, the following research questions are listed:

1. What are the perceptions of English-major seniors towards the usability, self-efficacy, and enjoyment of experiencing e-learning lessons on the LMS platform?

2. What are the perceived challenges of experiencing e-learning lessons?

3. What are some proposed solutions to enhance the quality of e-learning lessons?

2. RESULTS OF PREVIOUS STUDIES

Several studies have explored the implementation of e-learning courses in tertiary education, highlighting both opportunities and challenges. E-learning has been praised for its flexibility, accessibility, and capacity to support learner-centered pedagogy. For instance, Al-Fraihat et al. (2020) examined the success factors of e-learning systems in higher education and emphasized the importance of system quality, information quality, and user satisfaction in ensuring effective learning outcomes. Similarly, Singh and Thurman (2019) found that well-designed e-learning courses can enhance student engagement and academic performance when aligned with clear learning objectives and supported by interactive content. In addition, Fouad et al. (2022) find that students valued online courses and participated confidently. Similarly, Mad et al. (2020) highlight that students appreciated e-learning for helping them adapt to modern tools, preparing them for future challenges. On the other hand, navigating E-learning courses has faced numerous limitation such as infrastructure limitations, lack of digital literacy, and reduced face-to-face interaction have been commonly reported barriers (Abich & Eriku, 2023; Dhawan, 2020). Additionally, studies have highlighted the need for adequate training and support for both instructors and students to maximize the potential of e-learning platforms. These findings suggest that while e-learning can significantly enrich higher education, its success depends on thoughtful instructional design, robust technological infrastructure, and institutional support.

To address those challenges, some possible solutions have been suggested to better the effectiveness of E-learning courses. Abich and Eriku (2023) recommend that it is important to improve the e-learning utilization experience, consisting of higher officials' commitment to the system's implementation, profound training for the university community, e-learning facility fulfillment, and related policies, rules, and guidelines establishment. Furthermore, the government's allocated funds can solve internet access problems, expanded the internet network to remote areas, and offered internet quota subsidies (Abich & Eriku, 2023; Delita, 2021).

3. METHODOLOGY

This study was conducted in the Applying information and communication technology in Foreign Language Teaching online course at the Industrial University of Ho Chi Minh City, targeting English-major undergraduates. The participants were non-randomly selected, as they were pre-assigned to fixed classes before the study began. The course followed a fully online, synchronous e-learning approach using Moodle as the Learning Management System (LMS). It was delivered to three classes, comprising a total of 150 fourth-year students, from August to December 2024. At the end of the course, a structured questionnaire was distributed to all students, yielding 129 completed responses (104 female, 25 male). The participants were aged 20 to 22, as they followed a standard curriculum pathway. This study employed a mixed-methods research design to gain a comprehensive understanding of students' experiences with e-learning on the LMS platform. Mixed methods combine quantitative and qualitative approaches, allowing for a more nuanced analysis that overcomes the limitations of using either method alone (Creswell & Plano Clark, 2018).

A questionnaire was selected as the primary research instrument due to its efficiency in systematically collecting data from a large number of students while maintaining consistency in responses (Dörnyei & Taguchi, 2010). Questionnaires

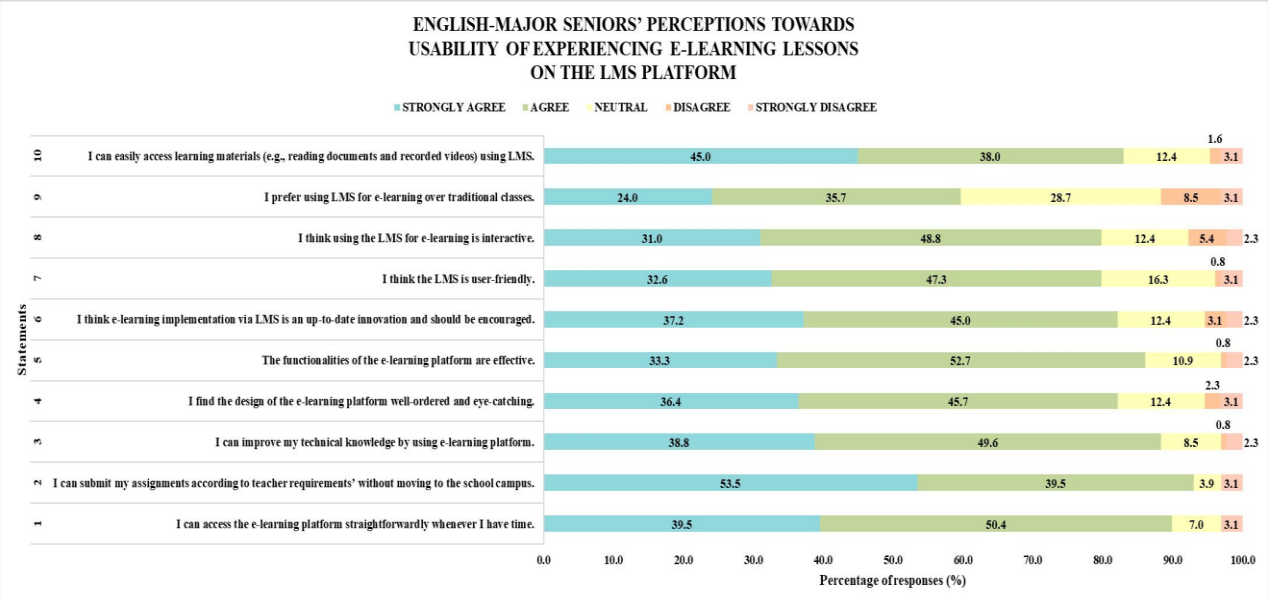
facilitate the quick gathering of structured information, making them a widely used tool in educational research (Bryman, 2016). Additionally, administering the questionnaire online allowed for cost-effective data collection, broader accessibility, and increased response rates (Evans & Mathur, 2018). The questionnaire consisted of four primary sections: (1) demographic information, (2) perceived usability, self-efficacy, and enjoyment when experiencing e-learning on LMS , (3) challenges encountered, and (4) suggestions for improving the student experience. A total of 27 questions were adapted from the research about the topic of students' perception towards E-Learning (Khan et al., 2021), which evaluates the usability, self-efficacy, and enjoyment of users interacting with digital platforms. To ensure a comprehensive data collection process, the questionnaire incorporated three different question formats: multiple-choice, Likert scale items, and open-ended questions. The online version of questionnaire was sent to participants in the last lesson via chat box. Online data collection reduces logistical constraints, enhances participant accessibility, and minimizes researcher bias (Janghorban, Roudsari, & Taghipour, 2014).

Twelve video lessons about integrating technologies in language teaching were created following the contents in the course curriculums. Each video lesson is about 20 to 30 minutes long. Video contents were made by the instructor in charge (researcher 1), the research team (researcher 2, 3, 4) helped with editing them. The contents of the lessons are about twelve topics related to the integration of technology in language teaching such as: basic concepts of technologies, designing PowerPoint lessons, integrating technology in teaching receptive, productive skills, grammar, vocabulary, pronunciation, integrating technology in language assessment, making videos for education, and using Artificial Intelligence in education. The video lessons were uploaded into LMS for students to watch and replay if applicable. After watching the lesson, students must complete the quiz to recap the important contents and apply the theory into practice applying technology into language teaching.

4. FINDINGS AND DISCUSSION

4.1. Findings

Chart 1: Analysis of the English-major seniors' perceptions towards usability of experiencing e-learning lessons on the LMS platform



The Cronbach's alpha test results indicate that the questionnaire demonstrated strong reliability across all constructs. The Usability scale achieved an excellent reliability score ($\alpha = .938$, N = 10), confirming high internal consistency. The self-efficacy scale also showed strong reliability ($\alpha = .923$, N = 7), with corrected item-total correlations ranging from .674 to .832. The enjoyment scale exhibited the highest reliability ($\alpha = .941$, N = 8), with minor improvements possible but unnecessary due to its already strong consistency. The perceived challenges scale had an acceptable reliability score ($\alpha = .828$, N = 5), while the Proposed Solutions construct showed good reliability ($\alpha = .895$, N = 6). These findings indicate that the questionnaire items effectively measure the intended constructs, supporting their use in further research.

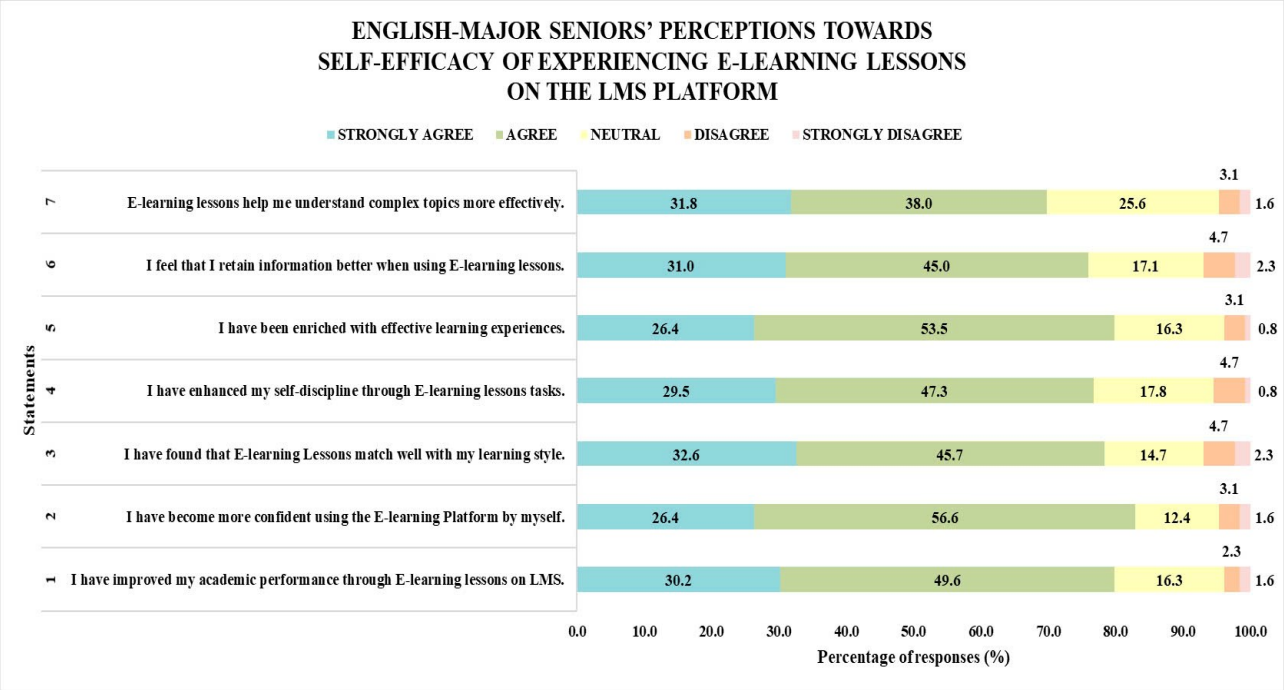
Students' perceptions towards the usability, self-efficacy, and enjoyment of experiencing e-learning lessons on the

LMS platform

Regarding the usability of E-learning lessons, Chart 1 shows diverse opinions from the participants towards this instructional approach. In general, most LMS features regarding usability receive high "Strongly Agree" and "Agree" responses. Specifically, over half of the students strongly agree that they don't have to go to school to turn in their assignments, according to teacher requirements and recognize that the LMS functionalities are effective. On the other hand, almost 30% of the students are neutral when talking about e-learning on LMS over traditional classes, and over 1/10 of them disagree, suggesting that many students still prefer traditional classes. This then reveals that the greater part of the participants have strong positive feedback towards the LMS functions, which is above average.

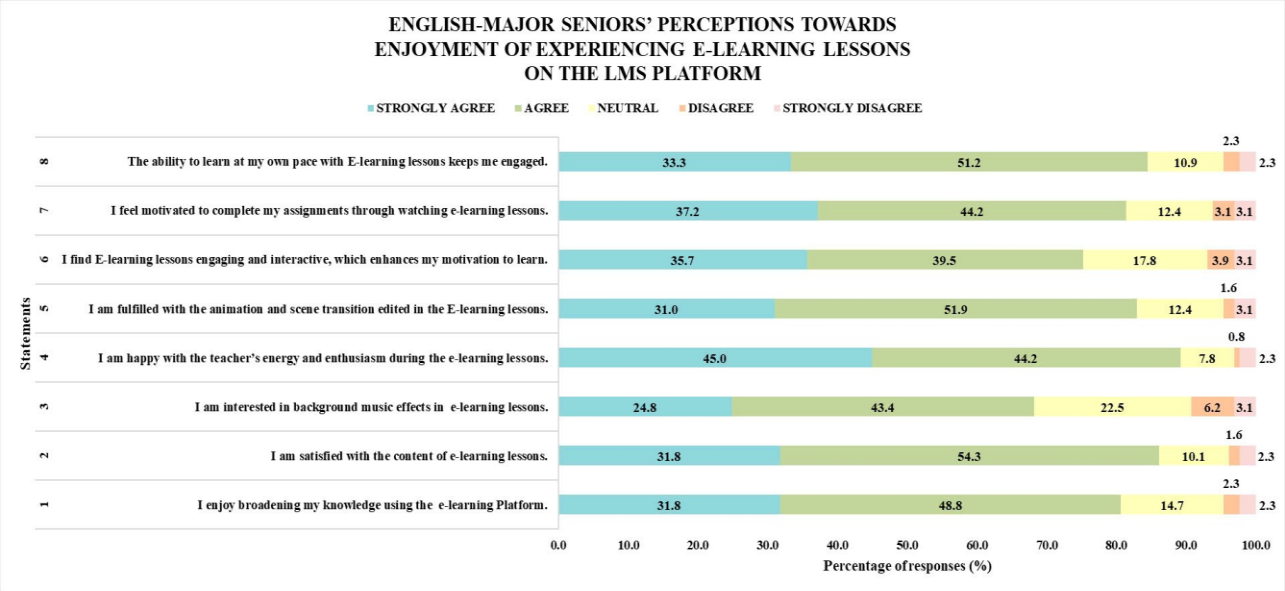
Chart 2 illustrates various perspectives of the students about their self-efficacy when experiencing e-learning lessons on the LMS platform. Generally, the majority of students agree or strongly agree with the statements, indicating that they find e-learning beneficial. Almost 60% of the participants agree that they feel more comfortable using the LMS platform on their own now, and over 50% of them are enhanced by effective learning experiences. In contrast, over a quarter of the students maintain a neutral attitude about e-learning lessons' effectiveness in helping them understand complicated subjects, and a small number of them disagree that e-learning lessons help them memorize information better.

Chart 2: Analysis of the English-major seniors' perceptions towards self-efficacy of experiencing e-learning lessons on the LMS platform



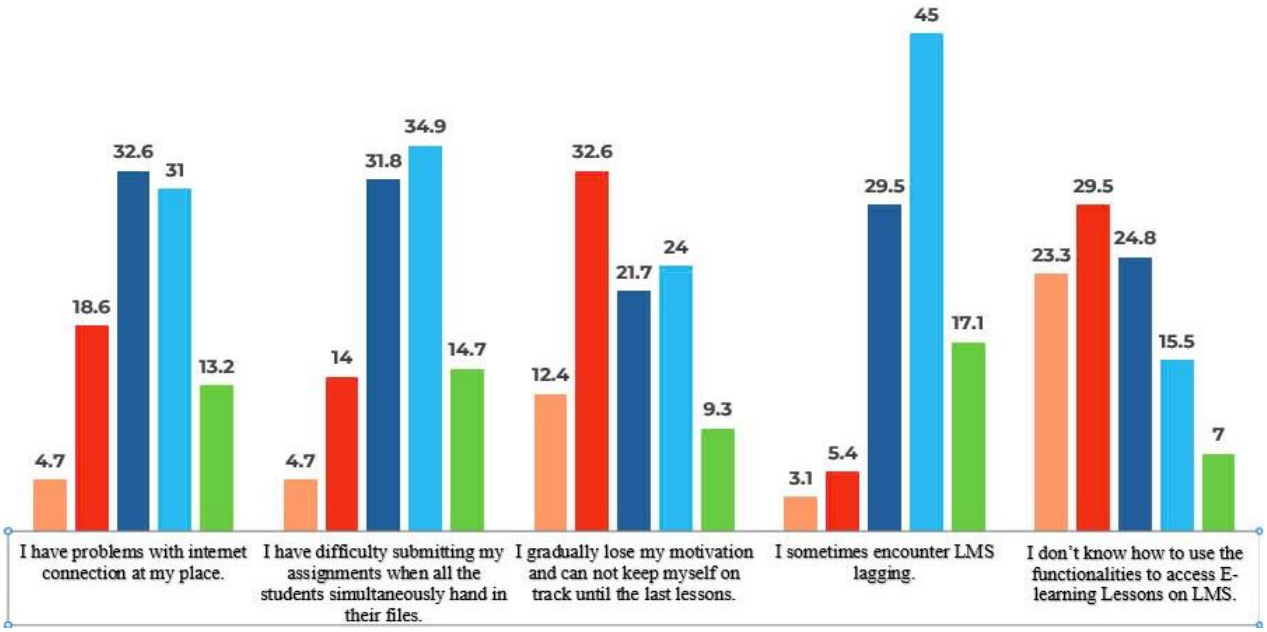
In terms of students' learning enjoyment, chart 3 demonstrates distinct notions of the students about their enjoyment while experiencing the implementation of e-learning lessons on the LMS platform. From the table, it is notable that over ½ of the participants feel pleased with the content, the animation, and the scene transition of the lessons. On the contrary, approximately one-fourth of them are neutral in terms of the background music effects, and about 10% of them are dissatisfied with this element. This points out that most of the participants appreciate different factors of e-learning lessons that affect their enjoyment, whereas there remains a small portion that is neutral or dissatisfied with specific aspects.

Chart 3: Analysis of the English-major seniors' perceptions towards enjoyment of experiencing e-learning lessons on the LMS platform



Perceived challenges of experiencing E-learning lessons

Chart 4: Analysis of the English-major seniors' perceived challenges of experiencing e-learning lessons on the LMS platform

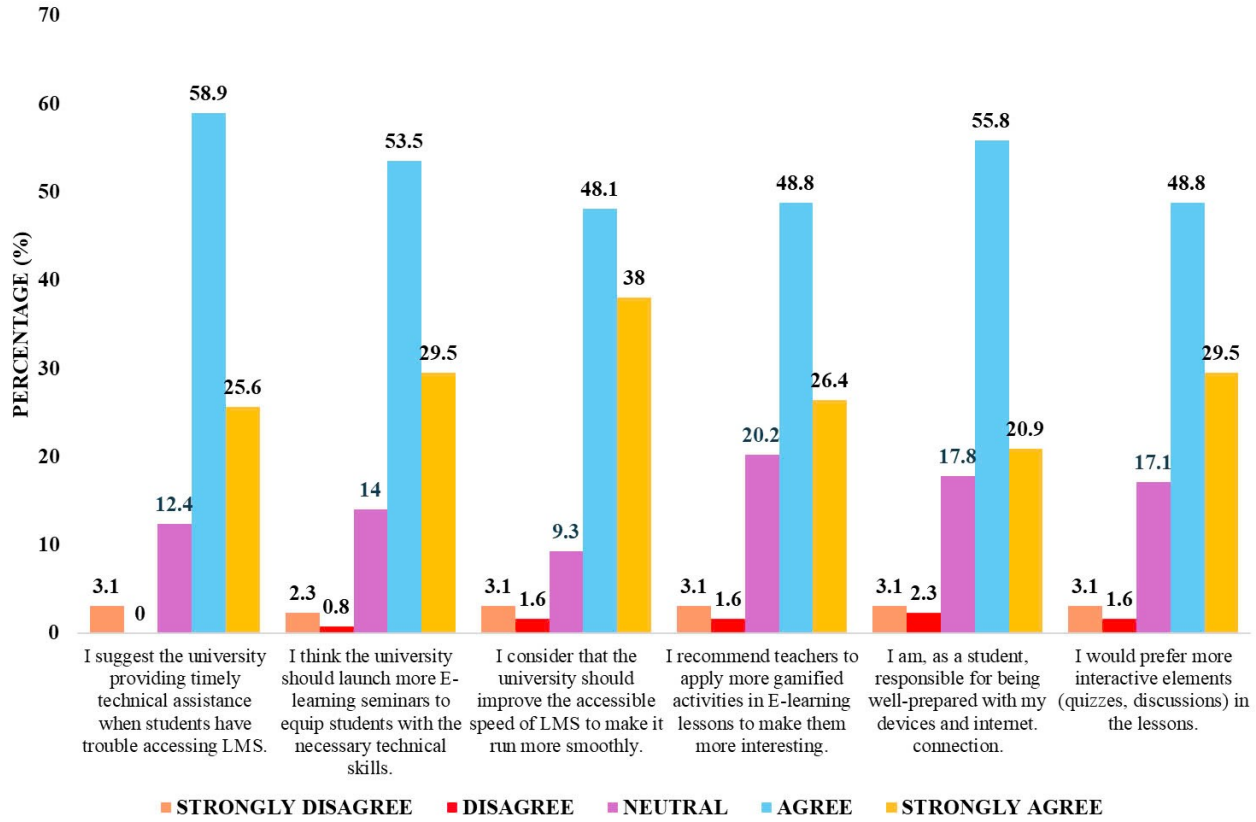


The findings of chart 4 show that three biggest challenges that students faced during the E-learning process include LMS lagging, difficulty in submitting the assignments, and internet connection, with high levels of agreement from the respondents: 45%, 34.9%, and 31% relatively.

Proposed solutions to enhance the quality of e-learning lessons

Chart 5 explores the proposed solutions to enhance the use of e-learning. The most crucial suggestion comes from the role of the university, which related to providing timely LMS technical assistance . Approximately 58.9% of the responses agrees that the university should try to give them timely aid when they encounter trouble accessing the LMS platform. Furthermore, 55.8% of the students suggest that students themselves should be esponsible for preparing their personal devices and the Internet. The next proposed solution that received more attention is about providing technical trainings (53.5%). Surprisingly, the two solutions on gamified activities and interactive elements simultaneously receive 48.8% agreement.

Chart 5: Analysis of the English-major seniors' proposed solutions to enhance the quality of e-learning lessons



To further enhanced the quantitative data, the analysis of qualitative data provides further insights for improving learning experience on LMS. The majority of students in this study believed that the LMS should enhance the signal lines since they have a significant impact on the student experience. "The thing that LMS need to improve is the system to load up their assignment, sometimes it maybe lag or errors." "Sometimes it's kinda lag so if I have a test at that time, I cant access the test and I hope the LMS can fix the lag when we access." Additionally, students anticipate that LMS will have elements that draw attention and enhance the mobile user experience. Students often comment on the promptness of responses and the variety of the content (videos, quizzes, etc.). I think LMS need to use Interactive Tools, use videos, podcasts, infographics, and articles to cater to different learning styles." "Ensure the LMS is fully optimized for mobile devices, allowing learners to access content seamlessly on their smartphones or tablets. Implement algorithms that personalize the learning experience by adjusting content based on a learner's progress, pREFERENCES, and performance." Regarding the proposed new feature, the students expressed their desire for them to be able to download this platform so they may access the website more easily. A course's design is focused on each student's unique learning schedule in order to enhance learning outcomes and provide an unparalleled experience. "A feature that lets students download content for offline use, helpful for those with limited internet access." "A feature that lets students download content for offline use, helpful for those with limited internet access."

Overall, the qualitative plan reveals that the majority of students had very favorable reactions to their involvement in improving the quality of e-learning on the LMS platform. To make the experience more comfortable and seamless, they emphasize the ability to integrate network transmission, interest, and convenience.

4.2. Discussion

The significant finding of this research was the usability of e-learning implementation. Most of the students (93%) strongly agreed and agreed that they could submit their assignments according to teacher requirements without moving to the school campus. This result indicated the effectiveness of using e-learning lessons regarding its usability. This finding aligns with Eslamian et al's. (2023) study of utilizing E-learning during the COVID-19 pandemic. It can be inferred that that no matter what happened in the pandemic days or normal daily basics, e-learning still appeared as an effective tool for acquiring new knowledge. On the other hand, our research finding indicate that students had an optimistic perception of e-learning, regarding usability, self-efficacy, and enjoyment. In particular, 83% of students have

become more confident using the e-learning platform by themselves. It was found that 86.1% of the students were satisfied with the content of e-learning lessons. This result is inline with Mahajan et al.'s (2018). This study highlights several key limitations of e-learning courses, particularly LMS delays, difficulties in submitting assignments, and unstable internet connections. These findings align with Cao (2023), who also identified LMS responsiveness as a major challenge. Additionally, the high traffic load on the LMS during peak times causes assignment submission difficulties, mirroring the issues reported by Furqon, Sinaga, and Liliasari (2023) regarding the impact of high-volume access on system efficiency.

Despite the widespread concern about internet connectivity issues, the study reveals that these challenges vary among students based on individual circumstances. This underscores the need for personalized interventions rather than a one-size-fits-all solution. Notably, students do not perceive these technical issues as significant barriers to their motivation or ability to use the LMS effectively. This is an encouraging finding, as it suggests that most students are competent in navigating the LMS and maintain intrinsic motivation for online learning. However, the presence of neutral responses indicates that some students may still struggle with confidence in their technical skills, emphasizing the need for further training and support.

5. CONCLUSION

After researching, this study concluded that the participants' opinions about their own experience of navigating e-learning lessons on LMS were diverse but mostly inclined to the positive side and above average. Most of them found this method effective, beneficial, and enjoyable. However, while experiencing it, they encountered several challenges in terms of LMS lagging, difficulty turning in their work, internet connection, loss of motivation, and lack of knowledge about LMS functionalities. Most participants reported that they had trouble when the did not go smoothly over time, besides the problem of assignment submission and the unstable internet connection. Furthermore, they suggested many solutions to enhance the LMS experience related to the university, teachers, and students themselves, as well as recommended newer functions and tools for a better learning experience on the LMS platform.

Our findings recommend that future research should explore the effectiveness of specific online teaching methodologies, such as collaborative learning, problem-based learning, and interactive digital tools, in enhancing student engagement and learning outcomes. Comparative studies could provide insights into which instructional approaches are most effective in different e-learning contexts. Additionally, future studies should expand the sample size and geographic diversity to improve the generalizability of findings. Research that includes students from various institutions, regions, and learning environments would provide a more comprehensive understanding of e-learning challenges and best practices. Longitudinal studies tracking changes in student perceptions and experiences with e-learning over time would be valuable. Investigating how students' needs, expectations, and attitudes evolve as they gain more exposure to digital learning environments can inform continuous improvements in online education strategies. Finally, research on the role of institutional support and faculty development is crucial for optimizing e-learning implementation. Future studies could examine how teacher training, technical assistance, and institutional policies influence the effectiveness and accessibility of online learning. Understanding these factors will help universities develop sustainable and student-centered e-learning models that enhance learning experiences for all students. Another significant recommendation emerging from this study is the urgent need for timely technical support from the university. Students overwhelmingly favor seminars and workshops focused on improving LMS proficiency, highlighting their willingness to actively engage in enhancing their learning experience. Additionally, there is strong student support for integrating interactive activities with learning metrics, indicating that students value engagement-driven approaches in e-learning.

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EMPLOYING PERSONAL LEARNING ENVIRONMENT APPROACH TO ENHANCE VIETNAMESE EFL STUDENTS' LISTENING COMPREHENSION

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ABSTRACT

Listening comprehension is an essential skill in English language education, but Vietnamese students commonly struggle due to inadequate exposure to authentic English and traditional teacher-centered approach. This literature review investigates the Personal Learning Environment (PLE) approach as a pedagogical strategy for improving Vietnamese EFL students' listening comprehension skills. This paper reviews literature related to PLEs and listening comprehension skills. In addition, it summarizes existing studies on the benefits of PLEs in learning listening skills. After that, this paper highlights the practical and pedagogical implications of adopting PLEs in teaching and learning listening comprehension skills. It provides insights for teachers and students on the potential of technology-enhanced, student-centered learning in developing listening comprehension.

Keywords: Listening comprehension; Personal Learning Environment; Technology-enhanced language learning; Vietnamese EFL students

1. INTRODUCTION

Listening comprehension is considered one of the most difficult skills for Vietnamese EFL students. This is also the skill that Vietnamese learners need to enhance the most (Nguyen, 2020). In terms of Vietnamese students' difficulties in listening comprehension, Tran and Duong (2020) show that students cannot comprehend English pronunciation and control speed rate. Lack of vocabulary is another problem they face; it is difficult for them to understand listening texts fully. Moreover, they find it difficult to grasp the intended message of the listening text. There are several reasons why Vietnamese students' communicative ability in general and listening skills, in particular, are low. Firstly, according to Nguyen (2023), even though the communicative approach has been encouraged in teaching English, teachers still continue to use grammar-translation methods in the classes. For teaching listening, teachers normally let students listen to the text several times to answer the questions, and then the teacher checks and explains the answers. The choice of using the Grammar-Translation teaching approach is explained by the large class size, mixed-level classes, examination-based curricula, and so on. Secondly, despite the importance of listening in second language education, it has been forgotten in English classes (Hoang & Duong, 2020). Teachers have not been diversifying learning materials to meet different individuals. Furthermore, according to Nguyen and Trinh (2023), one of the problems of Vietnamese students in learning listening skills is that they are not aware of learning it in a self-directed way.

With the advancement of technology, especially the Internet, the generation of students nowadays are called "net generation students" or "digital students" (Nguyen, 2020). They can more easily access available sources than the previous generation of students and therefore traditional teaching methods mainly using school textbooks cannot meet their needs. According to Bilyalova et al. (2020), students now can access information from multiple reliable sources apart from textbooks or lectures given by their home institutions. In order to maximize the benefits of technology in learning, the concept of Personal Learning Environments (PLEs) is created. PLEs are based on the principal philosophy of the learner-centered approach and are aligned with connectivism theory which was offered by Siemens (2005). According to this theory, learning takes place when a learner makes a connection among the ideas generated from the personal learning networks consisting of multiple information resources and technology tools. PLEs are viewed as a pedagogical approach using technologies for learning (Attwell, 2007). It is a concept which refers to making use of Web 2.0 technology to foster lifelong learning, informal learning, and self-directed learning.

In English language education, PLEs provide learners with ample opportunities to create their own learning process, determine their learning strategies and learn at their own pace (Dabbagh & Kitsantas, 2012). Tochon et al. (2014) claim

that PLEs can foster deep language and culture learning by offering unlimited authentic and updated resources. One of the most important values of PLEs lies in the perspective that language acquisition stems from social collaboration which leads to language awareness (Tochon et al., 2014). PLEs also have a cognitive benefit in enabling learners to reflect on their language learning process by taking advantage of the support and data from other people, having a sense of data ownership, and aggregating various resources. Another advantage of PLEs in language learning is that it facilitates text-based and task-based learning approaches in which students can experientially respond to the language as well as have time and space to understand language features and text structures (Tochon et al., 2014).

Since the concept of PLEs is relatively new and is constantly developing (Serhan & Yahaya, 2022), research and practice on PLEs remains in its infancy, especially in the Vietnamese context. Given that PLEs can significantly benefit students' language learning, this paper first aims to review literature related to PLEs and English listening comprehension skills. After that, some practical implications would be proposed regarding employing the PLE approach to enhance Vietnamese EFL students' listening comprehension skills.

2. LITERATURE REVIEW

2.1 Listening comprehension

2.1.1 Definitions of Listening Comprehension

Siegel (2015) states that listening comprehension is an active process that requires learners/listeners to concentrate on the meaning of auditory information and relate it to their prior knowledge. In other words, learners must be able to uncover meaning, which should be supported by a variety of elements, including linguistic aspects, listening strategies, and affective factors. Lynch and Mendelsohn (2013) defines listening comprehension as the capacity to comprehend the spoken language of native speakers. He also makes the point that, in addition to other skills like processing linguistic forms like speech speed and fillers, dealing with listening in an interaction, understanding the whole message contained in the discourse, comprehending the message without understanding every word, and recognizing different genres, it is necessary to be able to decode the speaker's intention when listening to spoken language.

2.1.2. Factors Affecting L2 Listening Comprehension

Listening Materials

Listening materials are considered to be one of the important factors in teaching listening. According to Nuralisa et al. (2025), it is necessary for teachers to utilize innovative and creative materials so as to motivate students in learning listening skills and therefore achieve the teaching goal. Specifically, students should practice listening and reading authentic materials as much as possible to reduce their difficulties in the learning tasks.

Background Knowledge

Background knowledge refers to the knowledge of the world or "schemata", which affects a listener's understanding of a topic. The listener is supposed to be able to construct meanings by integrating new information in the incoming data with their previous knowledge and strategy (Tilahun, 2008). Such knowledge may include listener's knowledge, cultural knowledge, and knowledge of spoken English. In order for EFL students to comprehend what they listen to, it is essential that they use their prior knowledge, which is correlated with their language competence.

Proficiency Level

Listeners' language proficiency significantly affects second language listening comprehension. Low proficiency levels might lead to the failure of listening comprehension. Tilahun (2008) states that proficiency level is related to how much a learner can employ their cognitive strategies. In addition, Bloomfield et al. (2010) point out that a student with greater working memory capacity tends to better understand what others say. Therefore, the higher learners' knowledge of the foreign language is, the higher their cognitive processing level is.

Vocabulary Knowledge

Vocabulary knowledge is regarded as a noticeable predictor of performance in all skills, especially listening skills (Milton & Masrai, 2020). According to Bloomfield et al. (2010), for L2 listeners, even a new word can stop listening and think about its meaning, which therefore affects the listening process. Han and Qian (2024) found that vocabulary size is the strong predictor for listening comprehension. Li and Zhang (2019) made an attempt to examine the impact of

vocabulary knowledge on students' performance in the General English Proficiency Test (GEPT) listening test. The results revealed that there is a significant correlation between vocabulary knowledge and overall listening skills.

Anxiety

Anxiety is also a characteristic of the listeners, which remarkably affects their ability to comprehend a spoken text. According to Bloomfield et al (2010), when the listener feels that the message is too complicated, they will believe that they cannot understand it. At the same time, their ability to be attentive decelerates, and their comprehension level decreases. Listeners tend to feel more anxious when listening to new information, when attempting to handle ambiguity, when being distracted, when losing concentration, and when they think that their performance represents their capacities or intelligence.

Accent

According to Vasquez Diaz and Iqbal (2024), accented speech is considered to be the most contributing factor to students' difficulties in intelligibility and comprehension. Listeners tend to be familiar with a specific accent and only be able to understand the speech from ones with a similar accent. Bloomfield et al (2010) point out that even native speakers who are used to hearing various accents find it difficult to comprehend a new accent or pronunciation for the first time.

Prosodic Features

Prosody refers to supra-segmental aspects including stress and intonation which are properties of syllables and larger units of speech (Arguedas, 2024). Stress and intonation are crucial for word recognition and the process of interpreting the utterances of the listener.

Speech Rate

Previous studies found that speech rate makes a great contribution to listening comprehension. Nadig (2021) claims that listening comprehension decreases when the speaker talks faster and vice versa. Fadli et al. (2024) also states that the faster the speech is, the worse the comprehension is. However, if the speech is too slow, this might make the listener lose the thread of conversation. Similarly, according to Medina et al. (2020), excessively slow speech has a damaging influence on L2 comprehension. Therefore, he adds that to improve the comprehension of natural speech, the listener has to be under pressure of dealing with the flow of speech as it naturally occurs.

Hesitations

Last but not least, hesitations in natural speech are an indispensable feature of spoken texts that impacts listening comprehension. Buck (2001) classified hesitations into four types: "a) unfilled pauses: periods of silence, b) filled pauses: fillers that speakers use ('um', 'mm', 'well', 'anyway', etc.), c) repetitions: speakers repeat the same word and d) false beginnings: speakers stop to replace previous word/phrase with another word/phrase.

2.2 Personal Learning Environments

2.2.1 Definitions of PLEs

Since the middle of the 2000s, there have been two different perspectives about PLEs. The first one considers PLEs as a methodology or concept, which is much more about pedagogy while the other explains PLEs under a technological view when seeing them as an object, a platform or infrastructure.

When it comes to the first viewpoint of PLE, a PLE is defined by Martindale and Dowdy (2010) as a particular tool or a collection of tools by learners for organizing and controlling their own learning. Siemens (2005) defines a PLE as a collection of tools; brought together under the conceptual notion of openness, interoperability, and learner control. Similarly, Chatti et al. (2011) explain that PLE is a method to generate new learning applications by gathering current data and services from a variety of sources. More specifically, it is a collection of free, distributed, web-based tools linked together on a blog and content is aggregated by utilizing RSS (Really Simple Syndication) feeds and HTML scripts.

The aforementioned definitions stem from the technological points of view of the scholars meanwhile there is another group perceiving PLEs as a pedagogical approach. Attwell (2007) emphasizes that PLEs should be considered as a new approach using new technologies for learning rather than a software application. According to Van (2006), a PLE is a system that enables students to control their own learning by assisting them in setting their goals, managing content and

process and communicating with other people during the learning process. It is a pedagogical model facilitating students' self-regulated learning in which they make their own choice, direct and plan their learning in a thoughtful and strategic way as well as adjust the learning process on their own needs, interests and pREFERENCES. It is a concept employing Web 2.0 technology to enhance lifelong learning, informal learning and self-directed learning. Meanwhile, Baran (2010) considers PELs as a networked learning in which the connections among learners, teachers, community and resources are promoted by using technology, which improves learner autonomy and self-regulation.

In general, there are two different approaches toward PLEs: 1) a technological platform to collect pedagogical tools; and 2) a catalyst to develop personal learning. Even though PLEs should not be technical but philosophical, ethical and pedagogic, most of the studies regarding PLE take the technological perspective and only a few researchers have evaluated the development of personalized learning (Fiedler & Valjataga, 2013).

2.2.2 Characteristics of PLEs

According to Rahimi (2015), the characteristics of a PLE can be identified according to four dimensions, namely organizational dimension, learner dimension, learning dimension, and environmental dimension.

With regard to the organization dimension, there are three characteristics of the PLE. First of all, PLEs are seen as a means to transfer adaptive personalization from customized personalization to dynamic personalization (Rahimi, 2015). According to Taylor et al. (2021), adaptive personalization refers to tracking students' pREFERENCES through activities and taking a control of what is ready for them. Customized personalization aims to make students engage with what the institution provides. Meanwhile, dynamic personalization is a student-led personalization in which students can determine the choice of learning resources supported by the system. Personalization should mean empowering users by not only supplying them with services but encouraging them to design services (Taylor et al., 2021). This is aligned with the PLE purpose of giving students choices and letting them design their learning environment by making use of these choices to satisfy their needs. Secondly, PLEs are considered to be the means to shift the learning responsibility from the institution to the students (Rahimi, 2015). Students, not the institution, should be the ones who create, own and customize their learning environment. There should be a change in the direction of the educational system from making students follow a predetermined system to conforming to the students. The last characteristic of PLEs in this dimension is that PELs are a means to replace or supplement instructional VLEs (Rahimi, 2015). There are two different viewpoints about the relationship between PLEs and VLEs. The first one leans toward the idea that PLEs replace learning management systems (LMS) and provide students with tools and practices to satisfy their needs (Attwell, 2021). In VLEs, the purpose is to convey the knowledge from the instructor to the students, the learning process and assessment are controlled by the instructor. On the contrary, in PLEs, students take an active role in building and implementing their learning environment according to their needs and preference (Atwell, 2007). However, some scholars argue that PLEs can not completely replace VLEs. The development of technology, especially Web 2.0 technologies has brought ample opportunities for students to generate their own learning environment (Attwell, 2021). Also, social interaction and knowledge sharing are enhanced through the integration of these technologies with other workplace e-learning applications. Nevertheless, these learning systems are not able to meet the needs of employees and achieve the goals of the organization systematically. Therefore, PLEs should be a supplement rather than a replacement for VLEs.

In terms of the learner dimension, the first characteristic is that PLEs are a means to promote students' sense of control and ownership (Rahimi, 2015). The focus of PLEs on students' control is in conformity with several learning theories including constructivism, social constructivism, and connectivism. Accordingly, a PLE plays an important role in assisting students to set their goals, self-manage their learning content and process, and interact with other people to reach their learning goals (Attwell, 2007). Meanwhile, according to Buchem et al. (2011), learner's ownership refers to students' responsibility for the aggregation and configuration of tools and services, their ownership of the content and psychology. Learners' control is related to "personalization", "adaptation" and "negotiation" while learners' ownership is about "personal responsibility" and "autonomy". The second characteristic in this dimension is the importance of PLE in fostering learner agency which is the human ability to make a choice and impose it on the world (Buchem et al, 2011). PLEs enable students to create their online social identity providing them with the prompt regarding what and whom to share and how to combine formal and informal learning in an effective way.

For the learning dimension, there are three characteristics. The first one is the role of PLEs in support of informal learning. PLEs are the combination of formal and informal learning in an organization (Attwell, 2007). By using PLEs, formal learning will be supplemented and supported by informal learning with the utilization of social networking and networking protocols to access a wide range of resources. The second characteristic refers to PLEs as a means to foster self-regulated learning. Drexler (2010) lists two characteristics of PLEs which are learner autonomy and self-regulation or self-direction. Constructing PLEs as a learner-centered activity will enhance learners' metacognition and promote their self-regulated ability leading to meaningful learning experiences. Dabbagh and Kitsantas (2012) propose a framework for utilizing social media to build PLEs supporting self-regulated learning at three levels: personal information management, social interaction and collaboration, and information aggregation and management. Haworth (2016) states that PLEs can make students become self-directed by "tracking, organizing, and accounting for their learning". The third characteristic is that PLEs are a means to facilitate collaborative learning. One of the benefits of Web 2.0 technologies and social media which are the major components of PLEs lies in the aspect of sociability. It is PLEs that can boost interaction and collaboration among students. Social software enables them to actively cooperate, support each other and share their resources as well as their knowledge and so on.

Last but not least, the fourth dimension is an environment with three characteristics of PLEs. First of all, PLEs are seen as a collection of Web 2.0 tools and services administered by students (Rahimi, 2015). This characteristic is derived from the technological perspective in which students are allowed to choose the tools to construct their learning environments to support their learning process. As defined by Attwell (2007), a PLE is a learning space where students collect Web 2.0 tools and communicate with their peers and experts. Downes (2007) mentions three components of a PLE in terms of technology, which include tools to manage a personal profile, edit and publish materials, tools to learn, communicate, scaffold and connect and tools to observe students' habits to guide them to relevant resources and activities. Attwell (2021) emphasizes the importance of integrating Web 2.0 into the educational environment by presenting four reasons: (1) students are familiar and skillful with Web 2.0, (2) it can promote self-directed life-long learning, (3) Web 2.0 tools have user-centered features and (4) Web 2.0 tool competencies are required for their future jobs. Next, PLEs are a means for students to co-design/co-develop their learning environment. According to Drexler (2010), constructing a learning environment itself is a crucial learning process which is created by both students and teachers thanks to various technologies and resources. It is hence necessary to provide students with different genres of technology so that they can develop their own learning environment according to their needs. Finally, PLEs are seen as a means to assist students in creating content. Attwell (2021) posits that with PLEs, learners can access content from different resources such as articles, videos, podcasts, wikis, blog posts and so on. In addition, they can have opportunities to discuss content with others.

2.2.3 Previous Studies Related to PLEs and Listening Comprehension

A thesis by Ospina Villabona (2019) with the purpose of figuring out the effectiveness of implementing PLEs in ELT to improve students' listening comprehension skills was carried out. The participants were 35 students enrolling in evening classes at Centro Colombo Americano de Bucaramanga. A customizable PLE was developed by using a blog and a padlet and students were required to complete active listening tasks through PLEs within 17 weeks. A pre-test and a post-test were administered to measure students' performance. The results revealed that students significantly enhanced their listening comprehension skills through the autonomous construction of resources collection.

El and Magd (2015) conducted a study to investigate the effects of a task-based personal learning environment on the listening comprehension skills of English major students. This study focused on two target listening comprehension skills which are guessing the meaning of unknown words and understanding implicit and explicit details. There were 30 English major freshmen at Suez Canal University taking part in this research. Regarding the research design, one group of experimental research with pre-test and post-test was employed. They found that a task-based personal learning environment significantly improves students' target listening comprehension skills.

Recently Suppasetseree et al. (2023) carried out a research study to explore students' engagement and opinions on an online PLE for listening comprehension through extensive listening activities. 30 Thai students took part in a 2-week research project. Questionnaires and semi-structured interviews were used to collect data. The findings indicated that

students exhibited significant levels of engagement in all three aspects: behavioral, cognitive, and emotional. The students held favorable views towards the online PLE, perceiving it as enjoyable. The combination of self-regulated and customized learning approaches contributed to enhancing vocabulary and pronunciation skills, despite encountering specific challenges related to time management and Internet connectivity throughout the project.

In the Vietnamese EFL context, there is a lack of research in connection with PLEs. Nguyen (2020) aimed at developing an online personal learning environment model (PLERN) to enhance students' academic listening comprehension skills and investigate students' opinions towards online learning through this model. Unfortunately, it was just a proposal providing the research design, research settings, participants and instruments but the official study has not yet implemented it in the real context.

In general, Vietnamese EFL students frequently face considerable difficulties in developing listening comprehension abilities due to limited vocabulary, strange accents, rapid speech rates, and an inability to comprehend the main ideas. These issues are normally from traditional classroom techniques that prioritize form-focused teaching while providing little exposure to real-world listening input. Furthermore, a lack of self-regulation might impede students' improvement in listening comprehension. Therefore, it is crucial to develop a PLE in which students can personalize their listening learning process to enhance their listening skills (Nguyen, 2020).

3. PRACTICAL IMPLICATIONS IN THE VIETNAMESE CONTEXT

Based on the literature review, there are substantial benefits to using PLEs to enhance Vietnamese EFL students' listening comprehension skills. PLEs offer a number of advantages, including increased exposure to a variety of English accents, speech patterns, and authentic listening resources that are frequently scarce in traditional classroom environments. By using internet resources like podcasts, audiobooks, TED Talks, and AI-driven listening tools, Vietnamese students can overcome the lack of direct engagement with native speakers that comes with learning English in an EFL context. Learners can interact with authentic spoken English in a flexible and customized way using these digital tools, which aid in the development of their processing skills for various speech rates, intonations, and colloquial expressions. In addition, students have opportunities to learn in a collaborative environment where they can share knowledge with their peers and learn from each other. Moreover, PLEs promote self-regulated learning, which is essential for improving listening comprehension. Students can control their listening experiences by selecting materials based on their proficiency levels, interests, and specific linguistic challenges. Ideally, students themselves should create their own personal learning environment where they can learn anytime, anywhere at their pace.

While PLEs allow students to take control of their listening comprehension development, teachers need to ensure that these environments are used efficiently and meaningfully. Adopting PLEs necessitates a shift in teaching practice in the Vietnamese educational system, where English instruction has been teacher centered. Teachers should be facilitators, guides, and motivators to assist students in navigating digital resources, developing independent learning habits, and engaging in self-directed listening practice. One of the most difficult issues in Vietnamese EFL classrooms is a lack of authentic English listening materials. Teachers can use PLEs to introduce students to a variety of listening materials, such as podcasts, interviews, news broadcasts, and spontaneous conversations, allowing them to become familiar with varied accents, speech speeds, and colloquial idioms. This bridges the gap between classroom learning and authentic language use, preparing students for academic, professional, and social interactions in English. Additionally, Vietnamese students are frequently used to passive learning, in which they rely mostly on teachers. However, listening comprehension is a skill that requires ongoing and autonomous practice. Teachers should use PLEs to enable students to take responsibility for their own learning by selecting digital materials that are appropriate for their interests and skill levels. For example, students who are interested in music, sports, or technology can interact with English content relating to these themes. This makes listening practice more engaging and relevant. It also cultivates learner autonomy and assists students develop intrinsic motivation, which leads to more sustained and effective learning outside of the classroom. However, teachers need to scaffold students by creating task-based activities such as listening to a podcast or TED Talk and summarize key ideas. Last but not least, listening comprehension should not be an isolated activity. It is necessary for teachers to construct a collaborative learning environment. For instance, students can share their reflection including their experience or vocabulary or grammar points they learn from listening sources with their peers.

4. CONCLUSION

In conclusion, this paper has reviewed literature related to PLEs and listening comprehension before presenting some practical implications for teaching and learning listening skills in the Vietnamese context. With the merits of PLEs, this approach is expected to address current issues, which thereby improve students' listening comprehension skills. Teachers are also encouraged to employ this approach in their teaching not only listening skills but other skills.

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FOREIGN TEACHERS' CHALLENGES IN TEACHING ENGLISH IN VIETNAM-BASED EDUCATIONAL INSTITUTIONS: A LITERATURE REVIEW

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ABSTRACT

Vietnam's emphasis on English proficiency, particularly through Project 2020, has led to increase the integration of foreign teachers inside classrooms. Despite their critical role in enhancing language education, foreign teachers face challenges related to cultural adaptation, pedagogical alignment, and institutional support. Difficulties arise from the mismatch between communicative language teaching (CLT) and Vietnam's exam-focused curriculum, students' passive learning habits, and pronunciation barriers. Additionally, systemic issues such as unclear recruitment policies, administrative burdens, and workplace isolation further hinder their effectiveness. Pedagogically, integrating localized training programs, co-teaching models, and scaffolded learning techniques can bridge instructional gaps and improve student engagement. Practically, clearer employment regulations, structured onboarding programs, and professional networking opportunities can enhance teacher retention and institutional support. Addressing these challenges strengthens foreign teachers' contributions to Vietnam's language education and ensures long-term sustainability in foreign teacher recruitment. This study provides insights for policymakers and educators seeking to optimize foreign teacher integration.

Keywords: Project 2020, challenges, foreign teachers, English

1. INTRODUCTION

The global and national significance of English as a critical skill has been extensively emphasized in scholarly literature, drawing attention from educators, policymakers, and researchers (e.g., Qi, 2016; Tran & Nguyen, 2024; Le et al., 2022). On an international scale, Qi (2016) argues that while English may not be universally indispensable, it remains a pivotal subject in standardized examinations. At the national level, Tran and Nguyen (2024) highlight Vietnam's substantial investment in education, with approximately 20% of the state budget allocated to this sector. These findings collectively underscore the recognition of English's importance across personal, national, and global contexts, reflecting its role as a gateway to academic and professional opportunities.

In response to the urgent need to enhance English proficiency, the Vietnamese government introduced Project "Teaching and Learning Foreign Languages in Vietnam National Education System, Period 2008 – 2020" (hereafter referred to as Project 2020) in 2008, a comprehensive national initiative to reform foreign language education. Spearheaded by the Prime Minister, the project outlined ambitious goals, including training Vietnamese teachers to achieve B2 proficiency according to Common European Framework of Reference for Languages (CEFR), revising policies to support foreign language (L2) education, upgrading infrastructure, and fostering collaborations with international organizations. A critical component of the project involved recruiting foreign teachers, including Native English Speakers (NES), to address pedagogical gaps in Vietnam's education system.

Scholarly evidence further reinforces the strategic value of foreign teachers in language education. Höckel (2020, 2024), drawing on data from the German National Educational Panel Study, found that immigrant-origin teachers significantly enhance students' reading comprehension. The study attributes this impact to three factors: (1) diverse linguistic competencies compared to native-born teachers, (2) role-model effects that motivate students from similar backgrounds, and (3) differentiated pedagogical approaches tailored to learners' needs. Similarly, Asano (2008) demonstrated that non-native teachers can achieve outcomes comparable to NES in specific contexts, particularly when leveraging bilingual advantages. These findings validate the rationale behind Project 2020's focus on recruiting foreign teachers as a means to elevate English proficiency.

Despite these efforts, Project 2020 was declared unsuccessful in 2016 by Minister Phùng Xuân Nhạ, who reported to the National Assembly that none of its goals would be achieved by the 2020 deadline. Scholars such as Tran and Tanemura

(2020) identified key flaws, including unrealistic benchmarks (e.g., expecting nationwide B2 proficiency within a decade), insufficient instructional time, fragmented implementation approaches, and varying starting points among students and teachers. Project 2020 was extended to 2025.

The global and national emphasis on English proficiency, as evidenced by Vietnam's ambitious Project 2020, underscores the critical role of foreign teachers in enhancing language education. While scholarly research highlights the potential of foreign educators to positively impact students' language skills, the failure of Project 2020 reveals systemic challenges in policy implementation, resource allocation, and pedagogical alignment. Despite recognized value, the experiences and perceptions of foreign teachers remain underexplored in the context of Vietnam's evolving language education landscape.

2. CHALLENGES FACED BY FOREIGN TEACHERS IN TEACHING IN VIETNAM-BASED EDUCATIONAL INSTITUTIONS

Vo (2014) examined the cultural challenges encountered by native English-speaking teachers (NESTs) teaching English as a foreign language (EFL) in Vietnam. The study contextualized its findings within the Confucian worldview that dominates many Asian educational settings, emphasizing collectivism, hierarchical relationships, and teacher-centered classrooms. The research identified cultural differences as a significant barrier, particularly in areas of classroom interaction, pedagogical expectations, and communication. For example, Vietnamese students, influenced by Confucian traditions, often adopt a passive learning style characterized by listening, note-taking, and avoiding direct communication or confrontation. NESTs, accustomed to interactive and participatory classrooms, struggled to engage students who viewed questioning or challenging teachers as disrespectful. Further complicating their teaching, culturally inappropriate materials often created discomfort in classrooms. Topics such as sex, religion, or poverty, frequently included in EFL textbooks from Western contexts, were perceived as taboo or offensive by Vietnamese learners. Additionally, the mismatch between CLT, often favored by NESTs, and Vietnam's exam-driven, grammar-focused curriculum posed another challenge. Teachers found that implementing CLT methods, which emphasize oral communication and student autonomy, conflicted with students' expectations for structured, exam-oriented instruction. In a similar vein, Phan (2015) explored the pedagogical and non-pedagogical challenges encountered by NESTs in Vietnam's both public schools and foreign language centers. The study utilized a grounded theory approach and semi-structured interviews with three qualified American NESTs who had at least two months of teaching experience in Vietnam. These participants primarily taught English methodology, communication, and speaking skills to Vietnamese learners and teachers of English. The findings revealed that pedagogical challenges were largely centered around differences in teaching methods and language issues. NESTs struggled with adapting their CLT approach to a context where grammar-focused instruction remains dominant. Alison, one of the participants, highlighted the difficulty of designing lesson plans that aligned with Vietnamese learners' expectations, stating it required significant adjustments to her techniques. Additionally, language differences between English and Vietnamese posed pronunciation and structural challenges, particularly when teaching speaking skills. NESTs had to explicitly teach articulation techniques, which often proved demanding for both teachers and learners. Non-pedagogical challenges included cultural and legal barriers. Participants reported difficulties in understanding and complying with Vietnamese traffic and teaching laws, as well as a lack of accessible information on regulations. Establishing mutual trust with institutional leaders was another critical issue, as it was necessary for obtaining permissions and building credibility within the educational system. Furthermore, noise distractions and shy learners, particularly in initial classes, hindered classroom engagement and effective communication. Dumlao and Mengorio (2019) conducted a study that looks closer into Non-native English-Speaking Teacher teaching English in Southeast Asia. The research explored the experiences of NNESTs teaching in Southeast Asia, with a focus on challenges specific to Vietnam. Using a qualitative phenomenological approach, the study involved semi-structured interviews with 12 NNESTs from diverse backgrounds, including the Philippines, India, and Malaysia. The participants shared insights into their professional and personal struggles while teaching in foreign educational contexts. Cultural differences emerged as a prominent challenge, with teachers reporting difficulties in adapting to Vietnam's hierarchical classroom dynamics and non-confrontational communication norms. Misunderstandings often arose due to students' reluctance to question authority, a behavior rooted in Confucian traditions, which impeded classroom interaction and engagement. Curriculum and resource limitations further complicated their teaching experiences. Participants highlighted that foreign-developed

curricula and textbooks were often misaligned with local students' linguistic competencies and cultural contexts, requiring significant adaptation. Additionally, NNESTs faced systemic discrimination due to the persistent preference for NESTs. This bias not only affected their professional credibility but also led to unequal pay and limited career advancement opportunities, despite comparable qualifications and experience. Professional adaptation was another key issue, as teachers struggled to reconcile their pedagogical styles with the local education system's expectations, which often emphasized rote learning and grammar-focused instruction over communicative competence. Some participants also noted feelings of isolation due to the lack of institutional support and professional development tailored to their needs as foreign educators. Like other research in this area, Mahrus and Rosayanti (2021) continually contributed to the existing body. This study examined the challenges encountered by NESTs teaching speaking classes at Vietnam National University of Agriculture (VNUA). Using a qualitative descriptive approach, the study involved observations, interviews, and document analysis with two NESTs as participants. While the teachers employed interactive strategies such as role play, group discussions, and storytelling to enhance students' speaking skills, several challenges emerged during the teaching process. Pronunciation difficulties were highlighted as the most significant issue. Vietnamese students struggled with ending sounds and certain English phonemes, particularly letters like "F," "J," "W," and "Z," which do not exist in Vietnamese. These pronunciation gaps often resulted in communication breakdowns and required the teachers to provide extensive drilling and corrective feedback. Another major challenge was students' lack of confidence in speaking English. Many were hesitant to interact with native speakers due to fear of making mistakes, leading to limited participation during class activities. Additionally, NESTs faced cultural and linguistic barriers. Students frequently defaulted to their own Vietnamese accent and struggled with fluency, causing misunderstandings. Furthermore, the lack of adequate vocabulary and grammar knowledge hindered students' ability to articulate thoughts clearly. Teachers noted that these linguistic shortcomings required significant instructional time and effort to address. Classroom management issues also arose, particularly in maintaining engagement with shy or underprepared learners. Another researcher also paying attention to NNEST is Lasula (2022). The study by Lasula (2022) explores the lived experiences of NNESTs in Vietnam, offering valuable insights into the challenges and rewards of teaching English in a context where native speakerism often prevails. Using a qualitative descriptive phenomenology approach, the study involved 12 NNESTs from diverse nationalities, including the Philippines, India, and Russia, who taught across various educational levels in major cities like Hanoi and Ho Chi Minh City. Through semi-structured interviews, the research identified five key themes: professional rewards, personal growth, career opportunities, professional predicaments, and personal drive. Notably, the study also highlights significant challenges faced by NNESTs, such as cultural differences, classroom management difficulties, and systemic racial discrimination, particularly the preference for NESTs in recruitment and promotions. In the same year, Laspoña (2022) conducted a mixed-method study to examine the career experiences and challenges faced by foreign English teachers in private bilingual and international preschools in Hanoi, Vietnam. The context of this research is grounded in the increasing demand for EFL instruction in early childhood education, with a focus on Hanoi, a city with a high concentration of bilingual and international schools, the study sought to uncover the obstacles faced by both NESTs and NNESTs. The purpose of the study was to identify and analyze the factors influencing teachers' career satisfaction and retention, with a specific emphasis on the interplay between teacher characteristics, student dynamics, and institutional support. Participants included 50 foreign English teachers, representing both NESTs and NNESTs, employed in private bilingual and international preschools across six districts in Hanoi. Data were collected through a survey questionnaire adapted from prior frameworks (Ezberci, 2005; Medyes, 1992), which was supplemented with semi-structured interviews conducted with 23 volunteer respondents to capture nuanced perspectives. The instruments covered demographic profiles, teachers' perceptions of essential attributes for effective teaching, and factors related to their experiences with students, schools, and personal career satisfaction. Findings revealed that cultural differences, language barriers, racism, and parental pressures were the most significant challenges reported by foreign teachers. NESTs often encountered difficulties in adapting to the local educational context and cultural expectations, while NNESTs highlighted biases favoring native speakers, despite their strengths in pedagogical knowledge and empathy. Both groups identified insufficient professional development opportunities and inconsistencies in recruitment policies as systemic issues, particularly in less-regulated institutions. Institutional factors, such as supportive leadership, administrative attitudes, and manageable workloads, emerged as critical determinants of job satisfaction and career longevity. The data also suggested that while NESTs

benefited from linguistic and cultural capital, NNESTs demonstrated a deeper understanding of students' linguistic struggles, positioning them as valuable yet underappreciated contributors to EFL education. In 2023, Nguyen et al., (2023) conducted a study to examine the status of foreign lecturers in Vietnamese public higher education institutions to discover their perception into 8 aspects (e.g., reasons for teaching in Vietnam, job satisfaction, challenges, etc.). The study utilized a questionnaire with 57 valid responses collected. Results found that the only challenge encountered by foreign lecturers is administrative work since it is time-consuming, laborious and complicated. Recently, Qasserras (2024) explored the job satisfaction and challenges of Moroccan ESL teachers working in Vietnam, focusing on factors such as work environment, cultural adaptation, and professional development. The study involved a mixed-methods approach, including surveys and interviews with teachers trained at the American TESOL Academy in Rabat. The findings highlighted several key challenges faced by foreign teachers. Cultural barriers were a recurring issue, with 16% of participants reporting difficulties integrating into Vietnamese society, primarily due to language differences and challenges in understanding local traditions and norms. Large class sizes, with an average of 45 students per class, posed significant difficulties for effective classroom management and individualized instruction. Additionally, regional disparities emerged, with rural educators reporting lower pay and fewer resources compared to their urban counterparts. While urban teachers benefited from better facilities and professional opportunities, only 5% of Moroccan ESL teachers were employed in rural areas, reflecting the challenges of working in under-resourced regions. The study also revealed linguistic barriers, particularly in pronunciation and remembering students' names, which 14% of teachers described as a significant challenge. Despite a positive outlook on cultural exchange, dietary restrictions and limited access to halal food have further compounded difficulties, especially in smaller towns. Interviews emphasized that teachers in rural areas often needed to exert additional effort to integrate games and activities into lessons, which could strain their professional capacity.

Most of the synthesized above literature data was collected from self-reported data, which gives readers an overview of how foreign teachers perceived obstacles encountered by themselves. Even though Project 2020 has launched and was extended to 2025, there is not a diversified literature body to collect data of perceived challenges encountered by foreign teachers. Therefore, this research seeks the challenges of foreign teachers from other perspectives which are students, co-teachers, institutional leaders and documentation (e.g., Nguyen and Nguyen, 2019; Le, 2023.). For instance, Nguyen and Nguyen (2019) conducted a study at a Vietnamese university offering high-quality English language programs, aimed to explore the challenges encountered by native English-speaking teachers (NESTs) from the perspectives of students and institutional leaders. Participants included 65 students enrolled NESTs in intensive academic English-speaking courses, predominantly at the IELTS 5.0–5.5 level, and four administrative leaders overseeing program quality and curriculum. Data was gathered through questionnaires, focus groups, and semi-structured interviews, allowing for a qualitative thematic analysis. Findings revealed that while students benefited from the linguistic competence and cultural insights of NESTs, significant challenges persisted. Key issues included ineffective teaching methods, reported by 84.61% of students, inadequate pedagogical skills, and a lack of cultural sensitivity. Students noted that NESTs often failed to provide meaningful feedback, relied heavily on textbook content, and struggled with classroom management due to limited awareness of local educational contexts. Moreover, 26.15% of participants highlighted difficulties in communication arising from cultural differences, further hindering rapport-building and effective instruction. Institutional leaders echoed these concerns, pointing to the absence of standardized recruitment processes and quality assurance mechanisms as contributors to inconsistencies in teaching quality. They observed that NESTs, often hired on short-term contracts, lacked long-term commitment and failed to collaborate effectively with local teachers. Aligned with the aforementioned scholarly perspective, Le (2023) conducted a study examining Vietnamese university students' perceptions of NESTs and NNESTs in pre-sessional English courses at an English-medium instruction (EMI) university in Ho Chi Minh City. The research, guided by the Competency Framework for Teachers of English for Academic Purposes (CFTEAP), aimed to assess how students viewed NESTs and NNESTs in terms of academic practice, understanding student needs, and program implementation. Data were collected via a survey of 30 students from the 2020–2021 cohorts and follow-up interviews with six participants. The findings revealed that while NESTs were perceived as superior in academic language proficiency ($M = 4.27$, $SD = 0.91$), NNESTs were highly appreciated for their ability to understand students' needs ($M = 4.23$, $SD = 0.73$). Despite these strengths, foreign teachers, particularly

NNESTs, faced significant challenges. The persistence of native-speakerism posed a barrier, with students often favoring NESTs for oral skills and pronunciation, echoing biases tied to the "native-speaker fallacy." Interviews highlighted how NNESTs' efforts to provide culturally tailored instruction were sometimes undermined by students' preconceived notions of their limitations compared to NESTs. Challenges also extended to feedback practices. NNESTs were criticized for offering overly detailed guidance that students described as "formulaic" and "robot-like," potentially stifling learner autonomy. Furthermore, students expressed concerns over NNESTs' ability to foster critical thinking and independent learning, areas where NESTs were considered stronger.

3. PEDAGOGICAL IMPLICATIONS

Foreign English teachers in Vietnam encounter multiple pedagogical challenges that require instructional adaptation to align with local learning practices. Vo (2014) and Phan (2015) found that cultural mismatches between CLT and the exam-driven system in Vietnam created barriers to effective classroom engagement. While CLT encourages active participation and critical thinking, students accustomed to passive learning viewed foreign teachers' interactive methods as unfamiliar or even ineffective (Nguyen & Nguyen, 2019). These difficulties extended beyond methodology, as Mahrus and Rosayanti (2021) observed that pronunciation errors, particularly with English sounds absent in Vietnamese, hindered students' oral proficiency. Similarly, Le (2023) found that students appreciated NNESTs for their ability to address linguistic struggles through scaffolded learning, yet institutional biases continued to favor NESTs, impacting student perceptions of teaching effectiveness (Lasula, 2022). The evidence from these studies points to the necessity of an instructional approach that balances explicit grammar instruction with communicative activities, ensuring that students receive both structured and interactive learning experiences.

Institutional biases and pedagogical misalignments further complicated the role of foreign teachers in Vietnamese classrooms. Dumlao and Mengorio (2019) and Lasula (2022) highlighted that NNESTs faced credibility issues despite demonstrating strong pedagogical competence, largely due to the widespread preference for native speakers. However, Nguyen et al. (2023) reported that students often struggled with foreign teachers' instructional styles when they lacked familiarity with local classroom expectations. Qasserras (2024) further noted that Moroccan ESL teachers in Vietnam experienced additional barriers due to linguistic and cultural differences, impacting their ability to integrate effectively into their institutions. Given these challenges, foreign teachers benefit from professional development programs that provide insights into Vietnamese students' learning habits while equipping educators with adaptive teaching strategies. Nguyen and Nguyen (2019) emphasized that collaborative teaching models, where foreign and local teachers work together, contributed to smoother lesson delivery and improved student engagement. Strengthening co-teaching efforts and integrating localized pedagogical training offer pathways to enhance teaching effectiveness for foreign educators.

4. PRACTICAL IMPLICATIONS

The challenges foreign teachers face in Vietnam extend beyond pedagogy, encompassing administrative, legal, and workplace integration issues. Nguyen et al. (2023) found that bureaucratic complexities surrounding work permits, unclear recruitment policies, and inconsistent employment conditions contributed to professional instability. Evidently, Nguyen et al. (2024) reveals significant disparities NESTs and NNESTs Vietnam's EMI programs that parental and institutional biases favor NESTs due to stereotypes about superior teaching skills and Western credentials, often relegating equally qualified NNESTs to assistant roles. Job advertisements frequently prioritize white NESTs, reinforcing systemic inequality. These practices stem from native-speakerism ideologies, where whiteness and Western nationality are conflated with teaching quality, alongside market-driven pressures to cater to parental pREFERENCES. Similarly, Qasserras (2024) highlighted salary disparities and career progression limitations, particularly for non-Western foreign teachers, which created dissatisfaction and high turnover rates. Without standardized hiring procedures and clear contractual terms, foreign teachers struggled with job security, affecting their overall teaching motivation. Nguyen and Nguyen (2019) pointed to the lack of structured onboarding processes as a key factor in these challenges, as many foreign teachers entered Vietnamese classrooms with little institutional support. Addressing these systemic issues requires clearer policies on recruitment, transparent employment conditions, and administrative guidance to ease foreign teachers' transition into Vietnamese educational institutions.

Beyond administrative barriers, foreign teachers experienced professional and social isolation, which affected their

integration into the school community. Dumlao and Mengorio (2019) and Lasula (2022) reported that NNESTs in Vietnam faced exclusion from decision-making processes, reinforcing a sense of workplace marginalization. The lack of intercultural communication training further exacerbated difficulties in establishing strong relationships with students, colleagues, and administrators (Laspoña, 2022). Nguyen and Nguyen (2019) found that foreign teachers unfamiliar with Vietnamese classroom norms encountered classroom management struggles, particularly when engaging passive learners. Le (2023) suggested that mentorship programs between foreign and local educators played a crucial role in bridging these cultural and pedagogical gaps. Establishing professional networking opportunities, co-teaching models, and intercultural training programs enhances workplace inclusion, ultimately contributing to higher job satisfaction and long-term teacher retention.

5. CONCLUSION

Foreign English teachers in Vietnam navigate a complex teaching landscape shaped by cultural, pedagogical, and institutional challenges. The contrast between CLT and Vietnam's exam-oriented education system continues to hinder classroom engagement, requiring teachers to adjust their instructional strategies to balance student expectations with modern language teaching methodologies (Vo, 2014; Phan, 2015). Pronunciation difficulties and linguistic barriers further complicate effective language instruction, reinforcing the need for scaffolded learning and explicit phonetic training (Mahrus & Rosayanti, 2021; Le, 2023). While NNESTs demonstrate strong pedagogical competence, biases favoring NESTs continue to influence both student perceptions and institutional hiring practices, highlighting the need for more equitable recognition of teaching effectiveness (Lasula, 2022; Dumlao & Mengorio, 2019).

Beyond pedagogy, foreign teachers encounter administrative and professional integration obstacles that affect their overall job satisfaction and retention. Legal complexities, unclear recruitment policies, and inconsistent support structures contribute to workplace instability (Nguyen et al., 2023; Qasserras, 2024). Professional isolation and limited intercultural training further challenge foreign teachers' ability to engage effectively with students, colleagues, and institutional leaders (Laspoña, 2022; Nguyen & Nguyen, 2019). Addressing these concerns requires a multi-faceted approach that includes policy reforms, structured onboarding programs, and collaborative teaching models that facilitate knowledge exchange between foreign and local educators. Strengthening institutional support mechanisms and fostering inclusive teaching environments will not only improve the experiences of foreign teachers but also enhance the overall quality of English language education in Vietnam.

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FOSTERING AI IN VOCATIONAL EDUCATION: OPPORTUNITIES AND CHALLENGES AT DONG THAP COMMUNITY COLLEGE

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ABSTRACT

This paper shares the experiences of Dong Thap Community College (DTCC) in integrating Artificial Intelligence (AI) into vocational education. The research explores DTCC's preparedness, identifies challenges, and highlights emerging opportunities for AI adoption. Using a combination of survey data from 143 lecturers (n=143) and semi-structured interviews with five key faculty members (n=5), the study captures real insights into the readiness of faculty, institutional efforts, and systemic barriers. Findings reveal that while AI is being piloted in areas like exam creation, learning assessment, and digital content generation, faculty face significant challenges related to AI literacy, infrastructure limitations, and ethical concerns. However, opportunities for innovation and curriculum reform are emerging, with DTCC planning to develop AI-specific training programs and labs. The paper concludes with recommendations for building AI capacity, including targeted training, curriculum redesign, and institutional policy support.

Keywords: Artificial Intelligence (AI), Vocational Education, Faculty Readiness, AI Adoption.

I. INTRODUCTION

Artificial Intelligence (AI) (Mertala, Fagerlund, & Calderon, 2022) is rapidly transforming global education (Fu & Weng, 2024), offering significant opportunities to improve teaching and learning outcomes (Guan, Zhang, & Gu, 2025), enhance personalization, and support lifelong learning (Parviz & Muhammed, 2024) (Luckin et al., 2016; UNESCO, 2021). In vocational education, AI can play a crucial role in aligning training with Industry 4.0 demands, supporting students in acquiring new technical and transversal skills (UNESCO, 2021). However, AI adoption in education, especially in vocational settings in developing countries, faces multiple challenges, including faculty preparedness, infrastructure limitations, and ethical concerns.

At Dong Thap Community College (DTCC), located in Vietnam's Mekong Delta, AI adoption is both an emerging opportunity and a complex institutional challenges. With the ambition that "DTCC is home of AI", DTCC has a great effort to enhance AI in teaching, learning, and institutional innovation. Although AI integration is at an early stage, DTCC has demonstrated significant steps that reflect institutional awareness and emerging readiness.

At the leadership level, DTCC is aware of the growing importance of AI and the need to align its educational offerings with Vietnam's AI Development Strategy to 2030. As a result, DTCC has planned to apply AI into its administrataion, including teaching, training, and leading the college. At mid-level administrators, DTCC urged faculty-led AI initiatives and innovations into action plans. Some individual faculty members have shown high initiative in exploring AI.

Particularly, DTCC required lecturers to take digitial courses and AI for teaching. Several lecturers at DTCC have started experimenting with AI tools to support teaching and assessment processes. These early AI applications include: AI-assisted generation of multiple-choice exam questions, helping to streamline assessment design; Use of AI-based tools to develop slides and video lectures, improving content quality and reducing preparation time; Initial development of an AI-based module for predicting and assessing student learning outcomes on the college's online learning platform (edtcc), showing a proactive approach to AI in educational analytics. These applications demonstrate a practical understanding of AI's potential, particularly in enhancing efficiency and supporting personalized learning (Pargman, McGrath, & Milrad, 2024) for vocational students.

2. METHODOLOGY

Data collection in the study was from mixed methods techniques, including 5 point-scale Likert surveys with 143

lecturers (n=143) and semi-structured interviews with five key faculty members. The study employed a stratified random sampling approach for the survey, ensuring proportional representation from all five faculties based on their respective sizes while achieving an 80% participation rate of DTCC's total teaching population of 178. To gain an in-depth understanding of the opportunities and challenges of AI adoption in vocational education, the authors conducted semi-structured interviews with five experienced lecturers from different faculties at DTCC. These lecturers were purposefully selected based on their active involvement in teaching, curriculum development, and technology application in education. The authors used purposive sampling to select five key faculty members (n=5) with diverse disciplinary backgrounds, technological proficiency levels, and leadership roles, each with at least five years of teaching experience and demonstrated interest in educational innovation. This complementary sampling strategy allowed for statistical generalizability through comprehensive quantitative data and rich contextual insights through carefully selected interview participants, strengthening the validity of findings through methodological triangulation. The participants represented five faculties: the Faculty of Electricity and Electronics, the Faculty of Mechanical Engineering – Construction, the Faculty of Engineering and Technology, the Faculty of Economics - Social Sciences and Humanities, and the Faculty of Agriculture and Fisheries.

The study aims to provide practical recommendations for AI-based educational innovations, contributing to both SDG 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth). This combination of large-scale surveys and in-depth interviews ensures both breadth and depth in understanding the landscape of AI adoption at DTCC, enabling robust triangulation of findings.

The survey results show that lecturers at DTCC generally demonstrate high awareness and readiness to use AI in education (Table 1). Over 75% of respondents agreed or strongly agreed that they know AI's potential and are willing to apply it in their teaching. However, while recognizing its value, many also acknowledged challenges such as limited training and ethical concerns, with more than 70% agreeing that using AI presents difficulties. Encouragingly, nearly 79% of lecturers saw clear opportunities for AI to enhance teaching quality, assessment, and student engagement. These findings highlight the enthusiasm and the need for continued support, training, and infrastructure to help faculty fully adopt AI in vocational education.

Table 1. Level of all agreement towards fostering AI at DTCC

Category	1- Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree
Awareness of AI	2.82%	1.41%	19.72%	43.66%	32.39%
Readiness to Use AI	1.41%	5.63%	15.49%	43.66%	33.80%
Challenges in Using AI	2.82%	4.23%	22.54%	42.25%	28.17%
Opportunities with AI	1.41%	2.82%	16.90%	42.25%	36.62%

Across five faculties at Dong Thap Community College, highlighting key indicators related to AI adoption (Table 2). Notably, the Faculty of Engineering and Technology shows the highest interest in AI (85.6%) and usage (45.7%). In comparison, the Faculty of Agriculture and Fisheries reports the highest AI literacy gap (78.3%) and lowest current AI tool usage (18.2%), indicating significant disparities in readiness across departments.

Table 2. Level of faculties' agreement of towards fostering AI at DTCC

Five Faculties (n=143)	**AI Literacy Gaps (%)**	**Interest in AI Adoption (%)**	**Infrastructure Concerns (%)**	**Ethical Concerns (%)**	**Currently Using AI Tools (%)**
Faculty of Engineering and Technology (n=35)	38.2	85.6	61.8	72.5	**45.7**
Faculty of Economics - Social Sciences and Humanities (n=36)	71.4	59.3	68.7	83.2	**41.7**
Faculty of Electricity and Electronics (n=27)	42.5	78.3	65.2	58.7	**38.4**
Faculty of Mechanical	56.8	62.7	72.4	51.3	24.6

Engineering - Construction (n=23)					
Faculty of Agriculture and Fisheries (n=22)	**78.3**	48.5	79.5	64.2	**18.2**
College Average	**57.4**	**66.9**	**69.5**	**66**	**27.8**

3. FINDINGS

3.1. Challenges in AI adpotion at DTCC

Infrastructure Limitations. DTCC's implementation efforts have encountered significant infrastructure challenges that constrain the scope and scale of AI adoption. Connectivity issues include show intermittent internet connectivity in some campus areas, particularly workshops and agricultural training facilities; Bandwidth limitations affecting simultaneous access to cloud-based AI systems during peak usage periods; and limited connectivity in surrounding communities affecting student access to AI-enhanced homework and independent practice. In addition, hardware constraints shows limitation in of aging computer labs with insufficient processing capabilities for more demanding AI applications; limited quantities of specialized equipment needed for AI-enhanced technical training; and uneven distribution of computing resources across departments and training programs. Challenges in software and licensing include high costs of commercial AI educational platforms relative to our institutional budget; licensing structures often designed for larger institutions with different resource profiles; and maintenance and update requirements creating ongoing resource demands. DTCC needs to improve physical space limitations such as workshop layouts designed for traditional instruction requiring reconfiguration for technology integration; limited dedicated spaces for technology-enhanced learning outside scheduled class periods; and power supply infrastructure inadequate in some specialized training areas.

Faculty Training Needs. DTCC's faculty development has emerged as a critical challenge requiring sustained attention for applying AI such as, knowledge and skill gaps (limited understanding of AI fundamentals and applications among many vocational instructors; technical skill deficiencies in utilizing and troubleshooting AI-enhanced learning systems; pedagogical challenges in effectively integrating AI tools with hands-on instruction) (Dolenc & Brumen, 2024); time and workload concerns (heavy teaching loads limiting time available for professional development; competing priorities between traditional teaching responsibilities and technology integration; limited compensation or recognition for additional time invested in AI adoption); resistance factors (concerns about technology replacing instructor expertise or diminishing instructional roles; skepticism about AI's applicability to traditionally hands-on vocational subjects; anxiety about personal technological proficiency and classroom technology failures); support system limitations (insufficient technical support personnel dedicated to educational technology; limited peer mentoring structures for ongoing implementation assistance; few opportunities for collaborative problem-solving across departments).

Curriculum and Content Gaps. DTCC's integration of AI into existing curricula presents several significant challenges are alignment issues (national vocational curriculum frameworks with limited provisions for technology integration; industry certification requirements not yet updated to reflect emerging technological changes; assessment standards focused on traditional demonstration methods rather than technology-enhanced approaches); content adaptation needs (existing teaching materials requiring substantial modification for AI-enhanced delivery; limited Vietnamese-language AI learning resources appropriate for vocational education; cultural and contextual misalignment in imported AI educational content); sequencing challenges (difficulty determining optimal placement of AI competencies within established course sequences; questions regarding prerequisites needed before engaging with AI-enhanced learning; balancing traditional foundational skills with emerging technological applications); scope and balance concerns (determining appropriate proportion of AI-enhanced versus traditional instruction; ensuring essential hands-on skills remain prioritized alongside technological competencies; addressing varying needs across programs with different technological relevance).

Similar to findings in other vocational contexts, educators report anxiety and uncertainty about using AI tools effectively (Holmes et al., 2019). While IT departments are leading AI efforts, Food Technology and Agriculture departments lag behind due to limited AI exposure (DTCC interviews, 2023). This pattern is consistent with international

research noting that AI adoption is discipline-specific and uneven (UNESCO, 2021). Lack of dedicated AI laboratories, high-speed internet, and AI software restricts broader AI integration (DTCC internal report, 2023). Infrastructure gaps are a common challenge in vocational education globally (Luckin et al., 2016). Faculty expressed concerns about data privacy, AI-generated plagiarism, and over-reliance on AI, similar to issues reported in global AI-in-education studies (UNESCO, 2021; Holmes et al., 2019).

3.2. Opportunities for AI expansion at DTCC

Data from interviews show that various AI tools are currently used in education and professional settings to support content creation, coding, design, and automation. Tools like ChatGPT, Gemini, and Copilot assist with generating text, images, code, and even videos, while platforms like Canva Pro and Capcut enhance visual and multimedia production through AI-powered features.

Table 3. AI Tools and Their Uses

ChatGPT, OpenAI, Text generation, Q&A, summarization, content creation, image generation (via DALL·E integration).
Gemini, Google, Multimodal AI: text/image generation, audio/visual analysis, automation in Google Workspace.
Copilot, GitHub/Microsoft, Code suggestions, explanation, debugging; integrates into development environments.
DeepSeek, Provides fast, accurate responses to text-based queries (limited public info).
Grok 3, xAI (Elon Musk), Details are unclear, but it is rumored to be conversational AI for integration with X (Twitter).
Leonardo & DALL·E, Various (OpenAI, Leonardo AI), AI-generated images for creative, educational, and design purposes.
TTSmaker & D-ID AI, Various, It is likely for text-to-speech conversion and AI-generated talking head videos (details limited).
AI Chatbot, Multiple Providers, Automates human-like conversations and supports customer service and educational FAQs.
Canva Pro, Canva, AI-assisted graphic design; templates, image editing, layout suggestions for presentations and media.
Capcut, ByteDance, AI-powered video editing for content creators and educators.
Laho AI's, relate to automation.
Gamma, in automation or data analysis; limited official documentation.

High expectation of readiness and willingness in AI application. Several lecturers at DTCC have started experimenting with AI tools to support teaching and assessment processes. These early AI applications include: AI-assisted generation of multiple-choice exam questions, helping to streamline assessment design; Use of AI-based tools to develop slides and video lectures, improving content quality and reducing preparation time; Initial development of an AI-based module for predicting and assessing student learning outcomes on the college's online learning platform (eDTCC), showing a proactive approach to AI in educational analytics. These applications demonstrate a practical understanding of AI's potential, particularly in enhancing efficiency and supporting personalized learning (Salih et al., 2024) for vocational students. Survey results from 143 lecturers across five faculties show that a significant portion of faculty members (around 65%) are interested and open to adopting AI tools if provided with proper training and support. Faculty members are leading AI-related discussions, with plans to revise and modernize the IT curriculum by replacing outdated modules with subjects focused on AI and Big Data, introducing AI concepts into practical teaching for Industry 4.0 readiness. There are also active discussions about establishing a dedicated AI research and teaching program, reflecting strong institutional ambition to keep pace with national and international AI education trends.

Institutional Awareness and Planning. At the leadership level, DTCC is aware of the growing importance of AI and the need to align its educational offerings with Vietnam's AI Development Strategy to 2030. DTCC has initiated conversations about creating an AI research and training lab to support faculty and students in AI-driven projects; supported the early adoption of AI in exams and content creation as pilot initiatives; and engaged faculty across disciplines (e.g., IT, Business, Finance-Accounting) in planning AI applications for teaching and assessment.

Faculty-Led AI Initiatives and Innovations. Some individual faculty members have shown high initiative in exploring AI. Activities include faculty in IT are collaborating to develop AI-based predictive models for student learning analytics; discussions are ongoing to revamp the IT curriculum, introducing AI and Big Data modules and potentially creating a full AI vocational track; plans for AI training workshops targeted at Finance-Accounting and other departments are being proposed to broaden AI adoption.

DTCC is planning to replace outdated IT modules with AI and Big Data courses, aligned with Vietnam's AI strategy. Curriculum reform is seen as a key opportunity to modernize vocational education for future labor markets. AI offers potential to personalize learning pathways and automate assessment — innovations aligned with global trends (Luckin et al., 2016; UNESCO, 2021). DTCC's plan to create an AI research lab will foster interdisciplinary projects, a step recommended by UNESCO (2021) to build sustainable AI education ecosystems.

3.3. Lessons learned and best practices from first stages at DTCC

Areas Requiring Further Development. While the initial preparedness is promising, DTCC still faces several gaps such as AI literacy training is not yet widespread, particularly outside of IT-related faculties (e.g., Food Technology, Agriculture, Hospitality); No dedicated AI laboratory or infrastructure currently exists, limiting the ability to conduct AI-based experiments or projects; Institutional policies and guidelines on AI ethics, usage, and academic integrity are under development but not yet finalized; and Support systems for faculty development in AI (e.g., workshops, mentoring, peer learning groups) are needed to build confidence and competence.

Strategic Implementation Approaches. DTCC's experience has yielded several valuable insights regarding implementation strategy which include start with Clear Educational Priorities (identifying specific vocational training challenges that AI might address; establishing clear success metrics focused on learning outcomes before implementation; ensuring alignment between AI capabilities and educational priorities across stakeholders); adopt phased implementation (beginning with high-impact, low-barrier applications to build confidence and momentum; implementing pilot programs with controlled scope before broader deployment; establishing feedback loops to inform adaptation before scaling; allowing sufficient time for adjustment between implementation phases); balance innovation and stability (preserving proven instructional approaches while augmenting with AI capabilities; ensuring contingency options when technology limitations arose; maintaining clarity about foundational skills regardless of delivery method).

Faculty Engagement Strategies. DTCC's faculty engagement emerged as the single most critical success factor in implementation. They are differentiated development approach (conducting detailed readiness assessments to identify starting points; creating multiple engagement pathways aligned with varying technical proficiency levels; providing both structured training and self-directed exploration opportunities; and balancing technical, pedagogical, and practical implementation aspects); champion identification and support (identifying and investing heavily in departmental champions across disciplines; creating formal recognition and support for champion roles; facilitating cross-departmental collaboration among champions; and developing champion-led workshops and mentoring relationships); meaningful incentive structures (providing release time for significant implementation efforts; recognizing innovation through institutional acknowledgment; developing career advancement pathways for educational technology leadership; supporting conference participation and professional development opportunities).

Contextual adaptation best rractices. DTCC needs to promulgate effective implementation with significant adaptation. They are localization beyond translation (developing culturally relevant examples reflecting regional industries and practices; adapting instructional sequencing to align with students' prior educational experiences; ensuring assessment approaches aligned with cultural learning expectations; and incorporating local industry practices and standards into AI applications); infrastructure-appropriate solutions (developing offline-capable components for intermittently connected environments; creating resource-efficient versions of applications for limited hardware; implementing hybrid approaches combining digital and analog components; and establishing access protocols that ensured equitable opportunities despite constraints); stakeholder involvement (engaging industry partners in reviewing contextual relevance; involving students in usability testing and feedback; consulting with international partners while maintaining local ownership; and creating cross-functional adaptation teams representing multiple perspectives).

They are in line with start with simple AI tools which builds faculty confidence gradually (Holmes et al., 2019). Promoting interdisciplinary collaboration helps reduce AI-related fears and improving collective learning (Luckin et al., 2016). Continuous AI training and mentoring is as emphasized in international guidelines (UNESCO, 2021). Institutional support includes leadership engagement, to facilitate AI policy development at DTCC.

3.4. Recommendations for AI adoption at DTCC

Qualitatve data showed that the current infrastructure at DTCC includes basic computers, limited internet bandwidth,

and a lack of specialized AI laboratories or licensed software (Table 3). To effectively implement AI in teaching and training, the college needs high-performance hardware, stable high-speed internet, AI-specific software licenses, and a dedicated AI lab to support practical applications and experimentation.

Table 3. Current vs. Required Infrastructure for AI Implementation at DTCC

Category	Current Infrastructure at DTCC	Minimum Requirements for AI Deployment
Computers & Hardware	Basic office PCs with limited RAM (4–8GB), no dedicated GPUs	High-performance computers with ≥16GB RAM, SSDs, and GPU-enabled workstations
Internet Connectivity	Moderate-speed internet; limited bandwidth in some classrooms/labs	High-speed, stable internet (≥100 Mbps) across all teaching and lab areas
Software & Tools	No AI-specific platforms; limited access to tools like ChatGPT (free)	Access to licensed AI tools (e.g., ChatGPT Pro, Gemini for Workspace, Copilot, etc.)
Multimedia Equipment	Basic projectors and screens in classrooms	Smart classrooms with AI-integrated AV tools, digital whiteboards, smart cameras
Cloud Storage & Servers	Limited internal storage; no dedicated AI server or cloud access	Scalable cloud storage (e.g., Google Cloud, Azure, AWS) for AI model training/use
Faculty Training & Support	Ad-hoc digital training; no formal AI training program	Regular AI workshops, certification programs, and technical support teams
Dedicated AI Lab	Not yet available	Fully equipped AI lab with trial zones for AI projects and hands-on learning
Policy & Governance	No formal policies for AI ethics or classroom use	Clear institutional policies on AI ethics, privacy, and pedagogical standards

Policy recommendations. DTCC needs to identify several policy priorities for supporting vocational AI implementation such as curriculum framework updates with labormarket (developing explicit AI competency standards for vocational qualifications; creating flexible implementation guidelines acknowledging institutional diversity; establishing balanced guidance on technology-enhanced and traditional assessment approaches; and providing frameworks for industry-education collaboration on technological competencies); resource allocation priorities (establishing dedicated funding streams for vocational AI infrastructure development; creating incentive structures for faculty engagement in AI implementation; developing resource-sharing mechanisms across regional institutions; and implementing support for research on vocational-specific AI applications); and quality assurance mechanisms (developing appropriate evaluation frameworks for AI-enhanced vocational programs; establishing guidelines for ethical AI implementation in educational contexts; creating recognition systems for innovative implementation approaches; implementing monitoring frameworks for ensuring equitable access and outcomes) (Funa & Gabay, 2025).

Enhanced training programs. Data show that DTCC needs to prioritize comprehensive training ecosystems include faculty Development Expansion (creating modular, competency-based AI readiness programs for vocational instructors; developing advanced certification pathways for educational technology leadership; establishing communities of practice across regional institutions; and implementing mentoring systems connecting experienced implementers with newcomers); student preparation initiatives (developing foundation digital literacy modules for incoming vocational students; creating early exposure opportunities to relevant industry AI applications; establishing technology ambassador programs enhancing peer support networks; and implementing career guidance incorporating emerging AI-impacted opportunities); and industry collaboration programs (establishing industry-education exchange programs focused on emerging technologies; creating collaborative training development involving workplace and educational expertise; developing shared infrastructure models leveraging industry technology access; and implementing industry challenge projects addressing authentic workplace scenarios).

Research Collaboration Opportunities. DTCC needs to expand more collaborative research directions. They are regional research network (establishing a Mekong Delta vocational education AI research consortium; creating shared research protocols enabling multi-institution data collection; developing comparative studies across varied institutional contexts; and implementing collaborative resource development informed by research findings); international partnership

opportunities (developing targeted research collaborations with international vocational institutions; creating comparative studies examining cultural and contextual factors; establishing joint publication initiatives enhancing regional visibility; and implementing exchange opportunities focused on implementation methodologies); and industry-education research (investigating workplace performance outcomes of AI-enhanced training; and studying emerging skill requirements across evolving regional industries).

The afored mentioned are in line with the previous studies. Faculty training and development is to provide practical AI workshops for vocational teaching, following UNESCO (2021) guidelines. Infrastructure investment is nesscessary for establishing an AI lab and secure necessary software/hardware, as advocated by Luckin et al. (2016). Institutional guidelines and ethics is to develop ethical guidelines for AI use in education (Holmes et al., 2019). Community of practice and collaboration is for creating AI teaching communities for peer learning (UNESCO, 2021). Curriculum reform needs for incorporating AI and Big Data into training programs to serve the labor market.

4. CONCLUSIONS

This study offers several critical contributions to the discourse on AI integration in vocational education, particularly in resource-constrained settings like the Mekong Delta region. Beyond documenting readiness and challenges, this research introduces a multi-tiered AI literacy model designed explicitly for vocational educators across diverse disciplines—one that acknowledges varying levels of digital proficiency and pedagogical needs. Moreover, it pioneers offline-capable AI implementation strategies, offering suggestions for minimum AI requirements at low-bandwidth environments that often fall outside mainstream digital transformation efforts.

Notably, Dong Thap Community College must initiate a "champion-mentor" model where early AI adopters mentor peers, fostering a sustainable, peer-driven culture of innovation. In tandem, the college's approach to localizing the AI curriculum—by embedding regional economic and cultural contexts—demonstrates how vocational education can remain deeply relevant while embracing emerging technologies. Therefore, more and more lecturers can learn and apply AI to their teaching. The research also proposes a phased implementation roadmap that helps institutions with limited resources prioritize impactful, low-barrier AI applications.

By combining technical innovation with inclusive design and contextual adaptation, DTCC is not only responding to Vietnam's national AI strategy but is actively shaping a replicable model for other community colleges in Southeast Asia and beyond. These pioneering efforts underscore DTCC's aspiration to become a regional AI-driven, community-centered vocational education college.

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ETHICAL AND SAFETY ISSUES IN DIGITAL TRANSFORMATION MANAGEMENT AT VIETNAMESE HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

Digital transformation in higher education is fundamentally changing management and training approaches. However, this process poses significant challenges in ensuring digital ethics and safety. This study analyzes the current situation and proposes solutions for addressing ethical and safety issues in digital transformation activities at Vietnamese higher education institutions. Through a multimethod research approach, integrating document analysis and field observation with empirical insights, the study identifies three main challenges: (1) limitations in infrastructure and technology, (2) gaps in digital capabilities, and (3) lack of an integrated management framework. Based on these findings, the study proposes an integrated and process-oriented management framework named CoMDES, encompassing policy, technology, and human resource development solutions whose applicability is illustrated in a specific institutional context. The research findings enhance the theoretical foundation for addressing digital ethics and safety issues in educational contexts while offering practical recommendations for educational managers amid widespread digital transformation.

Keywords: digital ethics, digital transformation, digital literacy, higher education, cybersecurity management

I. INTRODUCTION

Digital transformation (DT) in higher education has emerged as a critical driver of institutional modernization, reshaping governance, pedagogy, and stakeholder engagement. In Vietnam, this shift aligns with the government's National Digital Transformation Program (2025–2030) (Prime Minister of Vietnam, 2020), which prioritizes the integration of advanced technologies—such as artificial intelligence (AI), cloud computing, and the Internet of Things (IoT)—to enhance educational quality, operational efficiency, and global competitiveness. Vietnamese institutions face unique challenges rooted in infrastructural disparities, fragmented policies, and uneven digital literacy (Mariano, 2023; Q. S. Ngo & Vu, 2023; Tran, 2023), challenges that echo broader global concerns about equitable access and institutional readiness in developing contexts.

Scientifically, DT holds transformative potential for higher education. Technologies like AI enable personalized learning experiences and predictive analytics (G. T. Q. Nguyen & Hoang, 2024; Vu et al., 2023), while IoT facilitates innovative campus ecosystems (Kumar, 2024; T. K. P. Nguyen, 2021; Vu et al., 2023). However, the rapid adoption of these tools introduces ethical dilemmas, such as algorithmic biases and safety risks, including cybersecurity breaches targeting sensitive students and faculty data. Internationally, studies emphasize the need for robust governance frameworks to balance innovation with accountability (Díaz-Garcia et al., 2023), yet Vietnam's context demands localized strategies that address its socio-technical realities (Tran, 2023).

Practically, Vietnamese universities grapple with systemic barriers. Infrastructure gaps persist (Nghiem, 2023), while rural-urban divides exacerbate inequities in digital access (Tai et al., 2023). Faculty and students often lack training in digital ethics and cybersecurity (T. T. D. Ngo, 2021; Tran-Thi-Thanh, 2024; Vuong et al., n.d.), leaving institutions vulnerable to phishing attacks and data misuse (Mariano, 2023; Phan & Le, 2021; Phùng, 2021). Furthermore, DT initiatives remain siloed across departments, resulting in reactive governance and inconsistent ethical oversight (V. T. Le, 2022). These challenges underscore the urgency of harmonizing technological advancement with ethical safeguards.

Despite progress in digitizing administrative and pedagogical processes, evidenced by the proliferation of learning management systems (LMS) (V. H. Pham & Nguyen, 2023) and digital libraries (H. N. Nguyen & Phan, 2019)—the management of DT as a distinct institutional activity remains underexplored. Existing research focuses on technical adoption rather than systemic governance, leaving gaps in understanding how to operationalize ethical principles, mitigate risks, and build institutional resilience. This study addresses these gaps by employing a multimethod approach, combining

policy and document analysis with field observations and empirical insights from a targeted survey at a major public university, to analyze the ethical and safety challenges in Vietnam's higher education DT landscape and propose an integrated management framework, CoMDES. Through policy harmonization, technological reinforcement, and capacity-building strategies, the framework aims to support sustainable and inclusive digitization, grounded in both general analysis and specific institutional context.

By synthesizing theoretical insights, policy analysis, and empirical findings, this research contributes to the evolving discourse on DT management in developing contexts. It provides actionable recommendations for policymakers and educational leaders to navigate the complexities of digital ethics and cybersecurity while advancing Vietnam's educational modernization agenda.

2. METHODOLOGY

2.1. Approach

This study adopts an interpretive approach to analyze and propose solutions for managing ethics and safety in DT activities at Vietnamese higher education institutions. This choice is based on the view that reality in educational environments is constructed from stakeholders' subjective perspectives and needs to be understood by interpreting the meanings they assign to phenomena and behaviors (Morrison, 2012). This interpretive stance is operationalized through a multimethod strategy designed to capture these meanings from various angles, integrating qualitative analysis of documents and field observations with quantitative insights from a targeted stakeholder survey, and culminating in the development of a specific institutional application scenario for the proposed framework.

Specifically, the research focuses on three main aspects, explored through the aforementioned methods: First, the study examines ethical and safety challenges in institutions' DT process. Second, the research examines the regulations and policies of higher education institutions regarding digital ethics and safety. Third, the study proposes an integrated management framework for digital ethics and safety issues, informed by the preceding analysis and illustrated through its application to a specific institutional case.

With this multimethod interpretive approach, the research not only describes the current situation but also delves deep into the causes and context of issues—capturing both systemic trends revealed through document analysis and observation, alongside specific stakeholder perspectives gathered via survey—thereby proposing solutions appropriate to the characteristics of Vietnamese higher education.

2.1. Data Collection and Processing Methods

This study utilizes a multimethod research approach that integrates document analysis and field observation for the realization of its aims. Document analysis steps entail a comprehensive examination of national DT policies and laws in higher education; national policies/institutional documents such as strategic plans, implementation guidelines, and DT reports.

Furthermore, international standards and good practices on digital ethics and safety management are also identified. as well as academic literature of challenges and solutions for DT in higher education.

The data processing phase elaborates systematic coding and coding of information to develop categories followed by thematic analysis to identify themes and emerging issues. Repeating cross-validation of findings from distinct data sources generates high reliability and validity of the research outcomes. Eventually, the insights are then woven together to create a holistic management framework that addresses the identified constraints and capacity needs. This broad mode of thinking provides an encapsulated knowledge of digital ethics and safety management practice in the Vietnamese higher education institutions requisitioned across theoretical bedrocks to the practical nuances.

To further substantiate the analysis of practical challenges, particularly concerning digital literacy and institutional context, a targeted survey was conducted. The survey instrument assessed self-perceived digital safety competencies, perceptions of colleagues' competencies, and overall views on the institutional digital safety environment using a 5-point Likert scale (0=Never to 4=Always). This survey was administered to a purposive sample of 17 staff members at the University of Social Sciences and Humanities, Vietnam National University Ho Chi Minh City (USSH-VNUHCM), selected based on their involvement or awareness of IT and digital security matters (including IT staff, administrators,

and lecturers with relevant roles). The sample comprised 52.9% male and 47.1% female respondents, predominantly aged 31-40 (47.1%), with significant representation from the "5-10 years" and "Under 5 years" work experience categories (35.3% each). IT proficiency was primarily self-rated as "Intermediate" or "Advanced" (35.3% each) (Figure 1 illustrates the sample demographics).

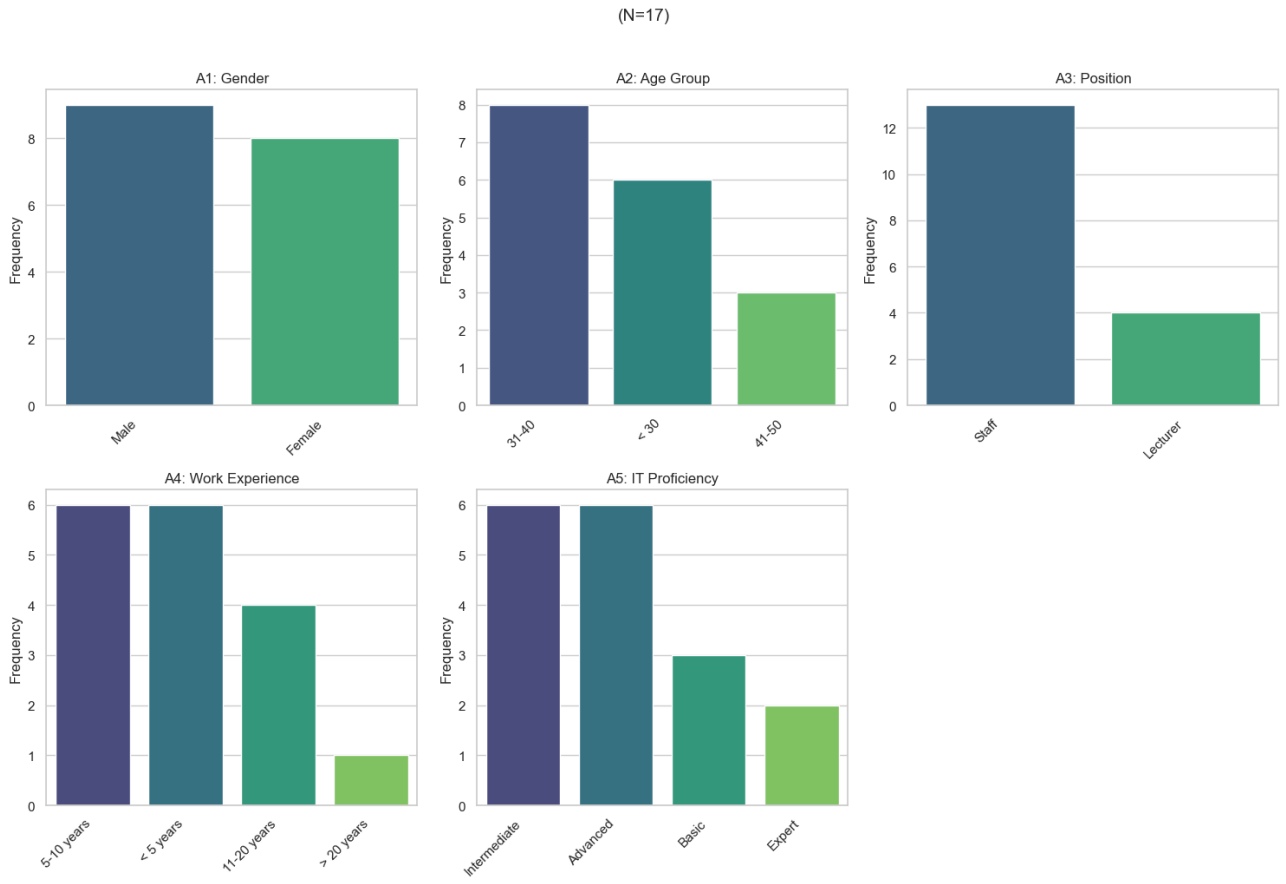


Figure 1. Sample Demographics Distribution

Data analysis was conducted using Python (version 3.12.9), leveraging several key libraries. pandas was primarily used for data loading, cleaning, and manipulation, while descriptive statistics (mean, median, standard deviation, frequency distributions) characterizing self-reported behaviors, perceptions of collective behaviors, and general institutional assessments were calculated using both pandas and numpy. The Wilcoxon Signed-Rank test, employed to examine the statistical significance of differences between self-perceptions and perceptions of colleagues for each safety behavior item, was implemented via the scipy.stats module. Data visualization, including frequency plots and comparative boxplots, was performed using matplotlib and seaborn. Given the small, non-representative sample size (N=17), findings related to collective competence are interpreted as the perceptions of this informed subgroup rather than a direct measure of the entire university staff's capabilities. Similarly, inferential statistics generated by scipy.stats are interpreted cautiously. The study acknowledges these limitations, using the survey data primarily to provide indicative empirical support for the broader challenges identified through document analysis and observation.

3. FINDINGS AND DISCUSSION

3.1. Challenges in Ethics and Safety Management of Digital Transformation in Higher Education Institutions

3.1.1. Infrastructure and Technology Challenges

Research results show substantial infrastructure and technology challenges in the management of ethics and safety of digital transformation at higher education institutions in Vietnam (Tran, 2023). Multiple dimensions of these challenges emerge.

First, insufficient digital infrastructure exposes a huge data security and ethical information management vulnerability (L. P. Nguyen et al., 2024). Surprisingly some of the top institutions mentioned above have anchored on the

new systems but many public universities are using old-age infrastructure (T. H. Le et al., 2024; T. T. D. Ngo, 2021; D. T. A. Pham, 2023; Phùng, 2021) that lacks essential security features (G. T. Q. Nguyen & Hoang, 2024). These constraints have serious ramifications on the protection of academic data, such as students' records, research data, and governance data.

Second, the fragmented technological infrastructure also poses grave challenges to formulating overarching ethical guidelines and safety measures. The presence of various platforms and systems, which are developed or purchased at irregular intervals without integration (S. H. Nguyen, 2024), creates security gaps and complicates the enforcement of unified ethical standards (Li et al., 2023). Such fragmentation is acutely manifested in the lack of uniform authentication mechanisms and access controls across various university departments.

Thirdly, the fragmented technological landscape, often lacking automated tracking and real-time monitoring tools, complicates the development and enforcement of comprehensive ethical/safety regulations and hinders prompt incident response (Tran, 2023).

Fourth, the insufficient investment in cybersecurity infrastructure (Vuong et al., n.d.) creates significant vulnerabilities. While digital transformation initiatives favor the implementation of new education technologies, investment in security does not keep pace. Organizations are far short of dedicated cybersecurity budgets (Vuong et al., n.d.) and expertise (G. T. Q. Nguyen & Hoang, 2024) and thus continue to be exposed to various digital threats.

Finally, technical limitations in data management systems impede ethical data handling and privacy protection, as challenges in implementing proper data classification, retention, and disposal procedures risk privacy infringements and unethical use, particularly with increasing volumes of digitized sensitive data (S. H. Nguyen, 2024).

These general observations are echoed in a targeted survey of 17 IT-aware staff members at USSH-VNUHCM. While this group demonstrated relatively high self-perceived digital safety competence (overall mean score of 3.37 out of 4, see Figure 2 for distribution), particularly in checking email authenticity (mean: 3.65) and providing information only on trusted sites (mean: 3.47).

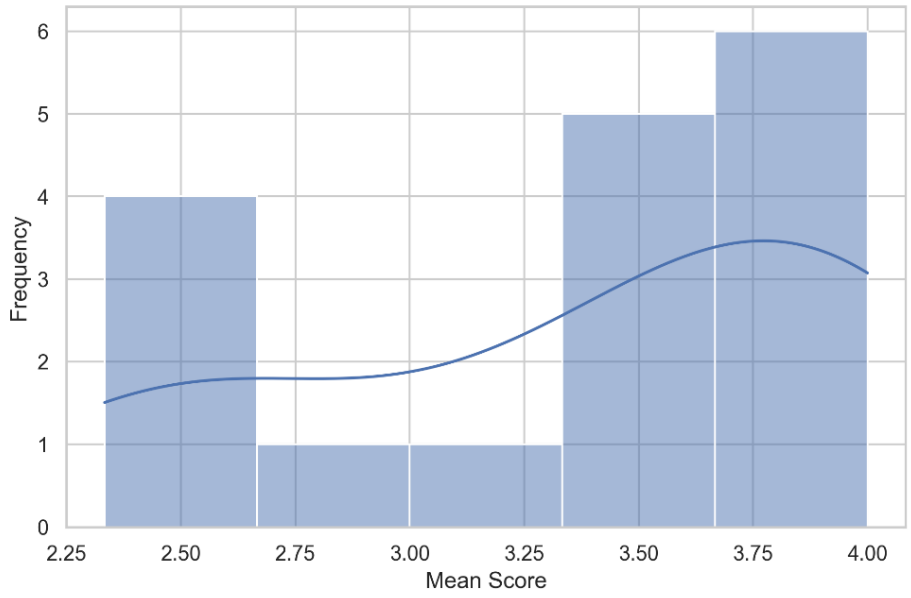


Figure 2. Distribution of Mean Self-Assessment Scores

Their perception of colleagues' competence was significantly lower (overall mean score of 2.45 out of 4, see Figure 3).

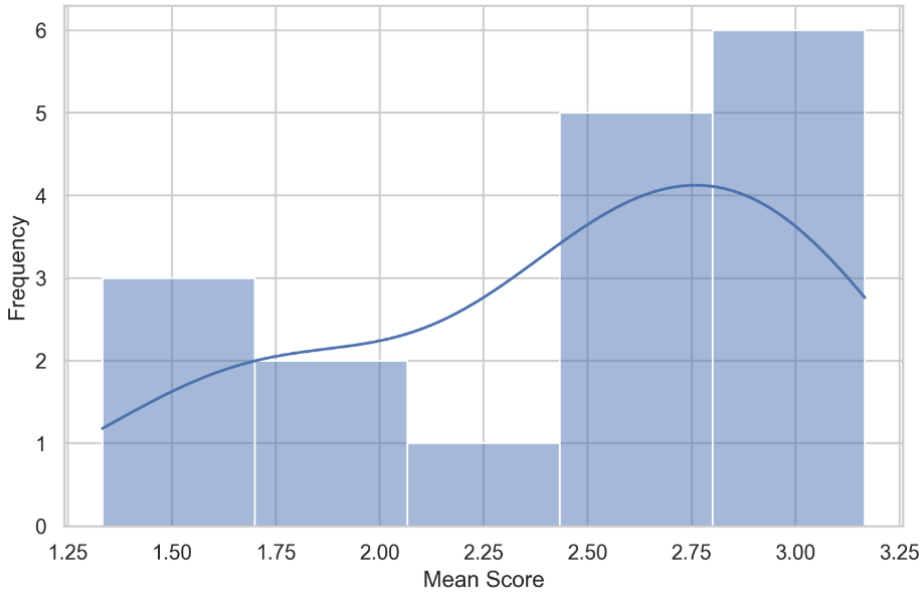


Figure 3. Distribution of Mean Perceived Colleague Scores

The Wilcoxon Signed-Rank test revealed statistically significant differences ($p < 0.001$ for most items, see Figure 4) between self-assessment scores and perceived scores for colleagues across all measured safety behaviors. This highlights a considerable perception gap, suggesting that individuals involved with IT feel their peers lag significantly in digital safety practices.

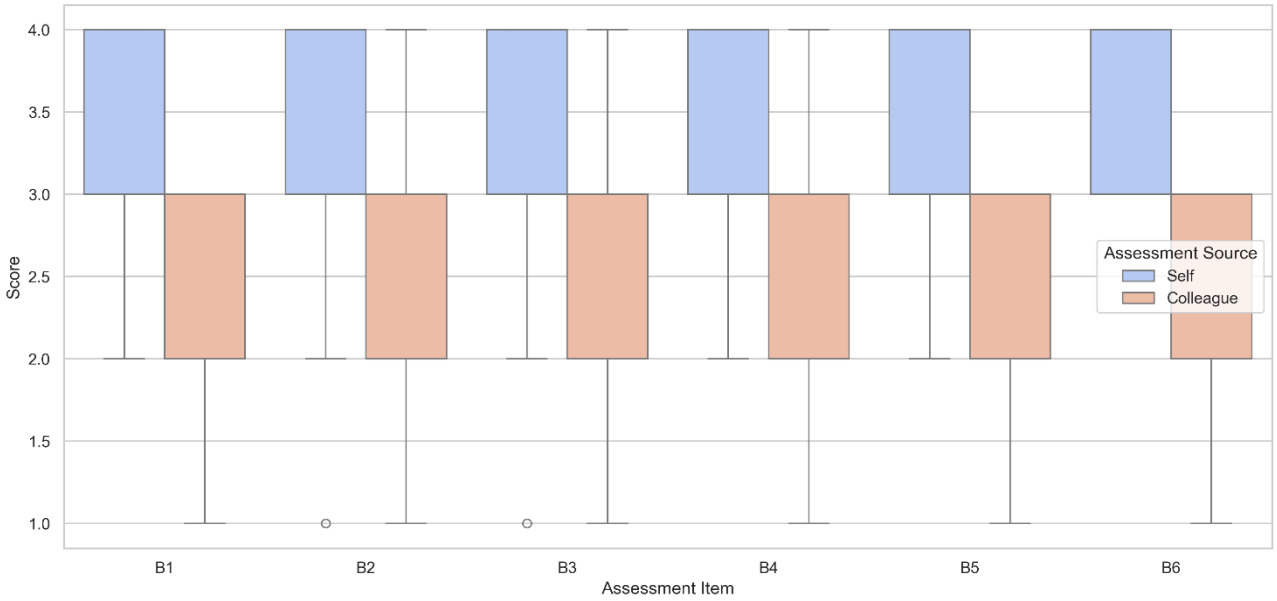


Figure 4. Comparison of Score Distributions: Self-Assessment vs. Colleague Perception

Specifically, the surveyed group perceived their colleagues as weakest in using strong and different passwords for academic and personal accounts (mean: 2.18, the lowest score). Other areas perceived as needing improvement among the broader staff included regularly updating software (mean: 2.41), consistently backing up important information (mean: 2.41), and carefully checking email authenticity (mean: 2.41). These perceptions, coming from staff likely more attuned to security risks, underscore potential vulnerabilities stemming from inconsistent practices across the institution. The perception regarding password hygiene is particularly concerning. Furthermore, the scope of observation varied among respondents, with the average respondent basing their collective assessment on an estimated 17.6% of colleagues (Figure 5 shows the distribution), indicating these perceptions are based on substantial, though varied, interaction.

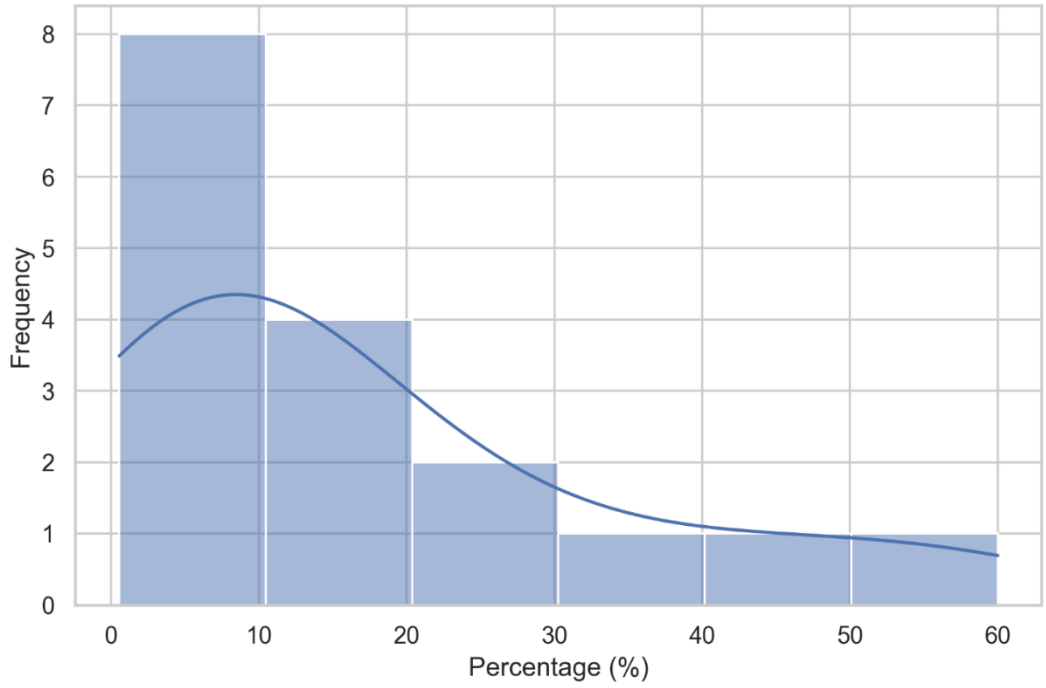


Figure 5. Distribution of Observed Colleague Percentage (%) (Estimated)

The infrastructural and technological issues do not just affect operational efficiency but also pose serious risks with regard to ethical compliance and cyber security (Tran, 2023). The results call for immediate attention to a more structured approach to infrastructural development with a balanced focus on technological innovation and ethical concerns in managing digital transformation.

3.1.2. Digital Literacy and Awareness Challenges

The digital transformation process in higher education in Vietnam is faced with significant challenges relating to digital awareness and literacy, particularly regarding digital behavior and security. These issues are apparent in several key dimensions:

Faculty face significant challenges, particularly senior academics, with slow adaptation to teaching technologies and limited awareness of digital security, data privacy, and ethical e-learning practices (T. H. Le et al., 2024; D. T. A. Pham, 2023). This encompasses weak capacity in using tools effectively, developing secure content, and implementing safe, compliant personalized learning models.

Students encounter challenges stemming from unequal technology access and threat exposure, alongside weak self-directed learning skills and low awareness of online safety, digital citizenship (Duong et al., 2024; Vuong et al., n.d.), academic integrity practices, and personal data protection.

Operationally, the lack of specialists in DT, educational technology, and cybersecurity (G. T. Q. Nguyen & Hoang, 2024) coupled with insufficient capacity-building, hinders institutions' ability to develop safe digital solutions and uphold quality, security, and ethical standards in online education and skill assessment.

The challenges related to inadequate policies and support are further reflected in the perceptions of the staff group surveyed at USSH-VNUHCM. The majority (64.7%) perceived the university's digital safety policies as “Existing but incomplete”, aligning with the need for more comprehensive governance frameworks. Correspondingly, digital safety training was largely perceived as infrequent, with 52.9% rating it as “Occasional” and 41.2% as “Rarely”. The general awareness level among staff regarding digital safety was predominantly seen as “Average” (64.7%) (Figure 6 details these general assessments). This perceived lack of comprehensive policies and regular training are likely to contribute to the inconsistent safety practices observed (as indicated in section 3.1.2) and highlights a critical area for management intervention.

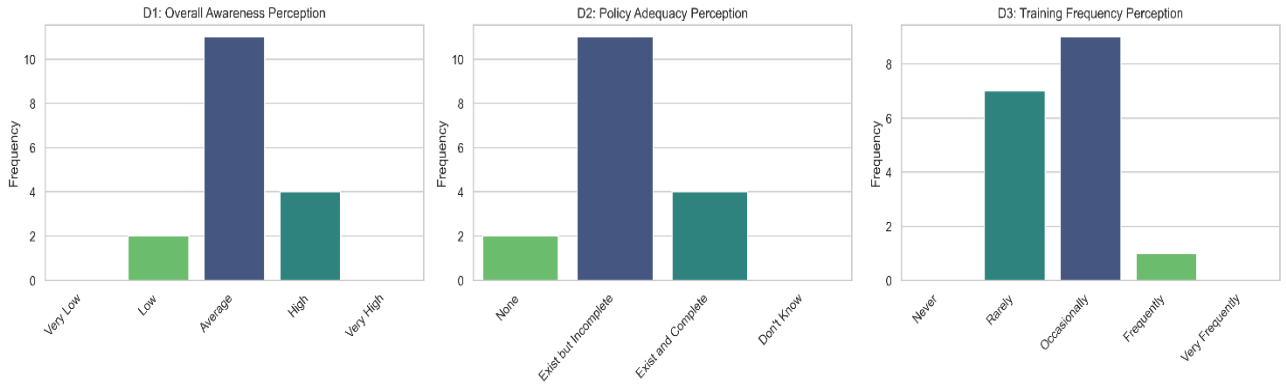


Figure 6. General Assessment of Institutional Digital Safety Environment

There are digital awareness and culture issues in tertiary education, particularly in ethics and safety. There is a lack of consensus among stakeholders on the need for digital transformation, especially when it comes to data security and privacy issues. Research has shown strong opposition to the shift from traditional to digital methods due to fears of misuse of personal data and cyber threats. Failure to collaborate and share on online platforms hinders growth and generates intellectual property and academic honesty problems. Moreover, a lack of awareness of safety and ethical issues risks the exploitation of personal data, academic data breaches, and cyber bullying.

Digital literacy and awareness issues in Vietnam differ institutionally and geographically. Some leading universities are strong in digital ability and security, while most, particularly in rural areas, still have issues of basic literacy and security. Digital readiness, awareness, and security gaps offer a complex ecosystem that influences Vietnamese higher education digital transformation.

3.1.3. Management and Policy Challenges

The digital transformation process in Vietnamese higher education is faced with numerous management and policy challenges, particularly concerning ethical governance and assurance of safety, and these are reflected in the following key dimensions:

Firstly, ensuring quality and assessment standards in online education necessitates comprehensive regulatory frameworks addressing data protection and academic honesty (T. H. Le et al., 2024; T. T. D. Ngo, 2021; Tran-Thi-Thanh, 2024). This requires clear policies on data privacy, cybersecurity, ethical data handling, usage rights for learning materials, and overall information security.

Second, comprehensive institutional change, including reallocating responsibilities for data security and ethical oversight, poses a long-term challenge. Hesitancy towards DT often stems from security and ethical concerns alongside pressure for immediate results (T. H. Le et al., 2024), amplifying the need for clear accountability structures.

Third, data management and security are significant challenges due to data inaccuracies, unreliability, and vulnerability to breaches. Institutions require robust data governance frameworks, significant cybersecurity investment, and personnel training to ensure data integrity, confidentiality, and availability against unauthorized access and misuse (Duong et al., 2024).

Fourth, applying end-to-end security solutions is challenging due to uneven DT adoption and often substandard infrastructure, particularly in resource-scarce regions, leaving many local institutions without adequate security controls, privacy measures, and ethical standards.

Fifth, fostering a balanced digital culture respecting both innovation and security is crucial but challenging. Many institutions lack robust frameworks and explicit policies for ethical technology use, data protection, and cybersecurity governing all stakeholders' activities in digital spaces, including educational technology and social media.

These management and policy problems are central challenges for effective and safe digitalization within Vietnamese tertiary institutions. The challenges' heterogeneity is also complemented by that of institutions being heterogeneous and unevenly prepared for the implementation of secure digital solutions. The interconnectedness of these issues—from quality assurance and data safeguarding to cultural adaptation and ethical compliance—tends to form a complicated web

of problems that the institutions must navigate very carefully in order to provide both educational efficacy and digital safety.

3.2. Development Needs and Directions

3.2.1. Urgent Requirements

Based on the analysis of current challenges, several urgent requirements emerge for managing ethics and safety in digital transformation at Vietnamese higher education institutions. The first critical requirement is the establishment of a comprehensive legal framework for digital ethics and safety management. This framework must encompass clear regulations on privacy and personal data protection for students and faculty, standards for ethical conduct in online research and teaching, procedures for handling cybersecurity violations and digital ethics breaches, and guidelines for responsible technology and data usage. These regulatory foundations are essential for creating a secure and ethical digital environment in higher education.

The second imperative mandate pertains to extensive technological infrastructure enhancement. The universities ought to implement multi-level security systems capable of real-time monitoring, establish high-resilience data centers with international standards, incorporate digital platforms for end-to-end management, and include new technologies such as AI and blockchain to develop strong security solutions. This technological upheaval is critical to protect sensitive academic data and maintain the integrity of digital study platforms.

The third urgent requirement is the development of digital competencies in all stakeholders. This includes providing specialist cyber security training to IT staff, providing information security and digital ethics workshops to academics, making students aware of privacy and security, and developing expertise in data governance and AI ethics. Developing these competencies is central to enabling the secure and sustainable implementation of digital transformation initiatives.

3.2.2. Priority Directions and Solutions

To meet urgent needs, certain core solutions are proposed in five fields. Institutions must set up Digital Transformation Steering Committees with an emphasis on ethics and safety, create Digital Ethics and Safety Handbooks, enact data protection legislation, and introduce monitoring frameworks. These frameworks will help reduce digital transformation risks and offer ethical compliance.

Key technology solutions include Zero Trust Architecture (Rose et al., 2020) for security, deploying end-to-end encryption for sensitive data, and the use of Security Information and Event Management (SIEM) systems (Bhatt et al., 2014) and Security Operations Centers (SOC) (Vielberth et al., 2020), along with centralized identity and access management.

Human resource development initiatives should focus on organizing certified information security training programs, building digital ethics communities of practice, conducting cybersecurity incident response drills, and developing comprehensive guidelines for digital safety and ethics. These capacity-building efforts will ensure that all stakeholders have the necessary skills and knowledge to participate effectively in the digital transformation process while maintaining high ethical standards. The development of digital culture requires launching information security awareness campaigns, fostering responsible sharing practices, promoting innovation alongside ethical considerations, and creating safe and respectful digital learning environments. Cultural initiatives are key to ongoing digital change and acceptance of moral practice. The urgency for capacity building and cultural shift is underscored by survey findings at USSH-VNUHCM, where IT-aware staff perceived a significant gap between their own digital safety practices and those of their colleagues (Figure 4), particularly concerning password management and software updates. Furthermore, the perception that institutional training is “Occasional” or “Rarely” offered (Figure 6) reinforces the need for prioritized, regular, and institution-wide programs focusing on fundamental security hygiene and fostering a culture of shared responsibility.

Development and collaboration projects must establish cybersecurity information-sharing communities, collaborate with AI ethics experts, participate in education security forums, and partner with security solution providers (Mariano, 2023). These will all ensure that the institutions are in line with the best global practices and effective security resources become readily available.

Implement these guidelines systematically, with consideration for the situation of each institution. Rank them in

terms of urgency, feasibility, and availability of resources. Regular reviews will ensure effectiveness in meeting the challenges of digital transformation for higher education.

3.3. Proposed Integrated Management Model

3.3.1. Model Structure and Components

They are transforming higher education through digital technologies that are enhancing teaching, administration, and student experience. Digitalization brings not only chances for new opportunities but also ethical, data protection, and responsible technology governance challenges. The absence of shared ethical values and safety standards risks unintended consequences, such as data breaches, digital divide, or unethical use of AI in teaching and learning.

It is in light of this that this study proposes a comprehensive management model named CoMDES (standing for Comprehensive Management for Digital Ethics & Safety) —a tripartite framework consisting of Educational Authorities, Educational Institutions, and Instructors —to render digital transformation innovative and secure. The model integrates ethical and security dimensions in three principal phases: (1) Goal-setting, (2) Controlled Implementation, and (3) Results Evaluation based on transparency and accountability criteria. As opposed to piecemeal solutions, this model emphasizes multi-stakeholder collaboration and continuous feedback loops for balancing technological change with the core values of education.

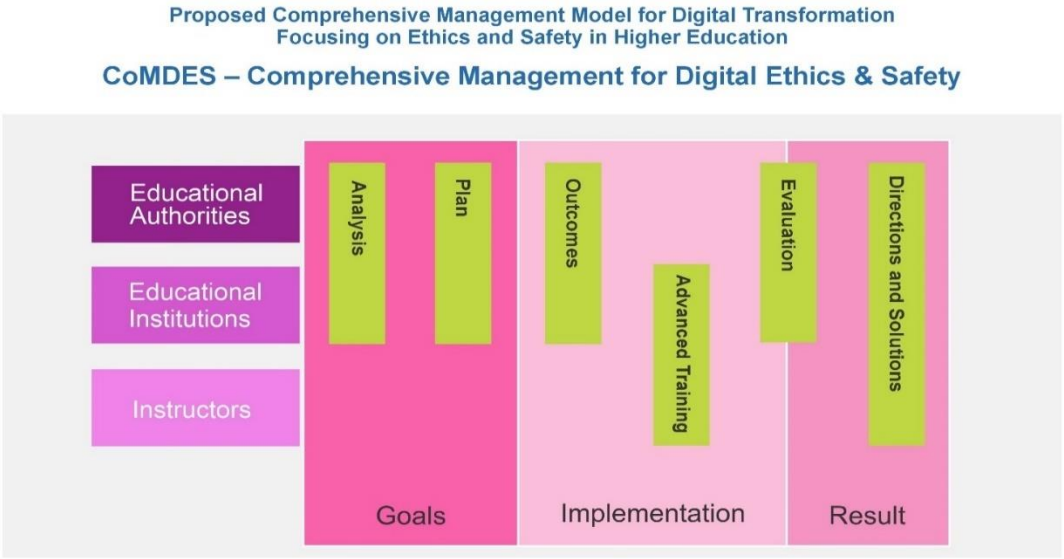


Figure 7. The proposed model: CoMDES – Comprehensive Management for Digital Ethics & Safety

This model provides a strategic framework to govern digital transformation in higher education with an emphasis on embedding ethical norms and enhancing safety protocols. It establishes three tiers of stakeholders: Educational Authorities, Educational Institutions, and Instructors, and guides them through a formal process of Goals, Implementation, and Result.

Digital transformation in education is no longer an option but a requirement in the contemporary context. To be effective and sustainable, there must be a defined structural model describing the role and purpose of all stakeholders. This model rests on three hierarchical levels: the policy level, the organizational level, and the individual level. At the apex are the Educational Authorities (Policy Level), comprising government departments, national education consortia, and international organizations. Their primary role is to formulate strategic policies and establish the regulatory framework for digital transformation, ensuring that they are aligned with ethical standards and safety protocols. At the Educational Institutions (Organizational Level), learning institutions such as universities and colleges translate such policies into actionable strategies. They are tasked with creating a sound digital learning environment, equipping faculty members and students with the tools and competencies required, and safeguarding data integrity and cybersecurity. Finally, at the Instructors (Individual Level), educators assume the mantle of digital pedagogy, integrating innovative technologies into their instructional practices and fostering a culture of digital citizenship among learners. The operationalization of this model is facilitated by a structured process framework, comprising three iterative phases:

strategic planning, implementation, and impact evaluation. In the Strategic Planning process, stakeholders collaboratively set goals, conduct situational analyses, and chart a step-by-step roadmap for digital transformation. The Implementation process is occupied with the utilization of emergent technologies, building online learning communities, and offering targeted professional development opportunities. The Evaluation process entails systematic examination of digital transformation initiatives, assessing their success in enhancing learning outcomes, institutional efficiency, and adherence to ethical imperatives. This model emphasizes not only the hierarchical structure but also the symbiotic existence of stakeholders. Most critical are synergy and interoperability, building a culture of cooperation and exchange of knowledge. The iterative process allows continuous adaptation and refinement, rendering digital transformation responsive to evolving needs and challenges. Embedded in this model are safety considerations and ethical issues, so that digital transformation not only enhances technological proficiency but also creates a responsible and sustainable digital learning space.

The implementation roadmap of the CoMDES model is structured to align with its three-level stakeholder framework and three-phase process. Table 1 presents a detailed matrix of implementation activities across different timeframes and stakeholder levels.

Table 1. Phased Implementation Matrix of the CoMDES Model

Phase	Stakeholder Level	Goals	Implementation	Result
Short-term (1-2 years)	Educational Authorities	Develop national digital ethics frameworks; Establish regulatory guidelines; Set security standards	Create policy implementation guidelines; Allocate resources; Monitor compliance	Evaluate policy effectiveness; Assess national digital safety metrics; Review regulatory impact
	Educational Institutions	Define institutional digital strategies; Create ethics committees; Plan infrastructure upgrades	Deploy basic security systems; Establish digital governance structures; Implement training programs	Measure institutional digital readiness; Track security incident rates; Assess policy compliance
	Instructors	Set personal development goals; Plan digital teaching strategies; Identify training needs	Participate in digital skills training; Apply security protocols; Implement ethical guidelines	Evaluate teaching effectiveness; Monitor student engagement; Report security concerns
Medium-term (2-3 years)	Educational Authorities	Revise national frameworks; Enhance cooperation mechanisms; Develop advanced standards	Coordinate inter-institutional initiatives; Support technology adoption; Foster innovation	Analyze cross-institutional data; Evaluate framework effectiveness; Update national strategies
	Educational Institutions	Expand digital capabilities; Enhance security systems; Develop specialized programs	Implement SIEM and SOC; Create digital ethics communities; Conduct security drills	Assess technological maturity; Measure security effectiveness; Evaluate program impacts
	Instructors	Advance digital competencies; Develop innovative teaching methods; Lead peer learning	Apply advanced digital tools; Mentor colleagues; Contribute to best practices	Measure learning outcomes; Share success stories; Contribute to knowledge base
Long-term (3-5 years)	Educational Authorities	Integrate AI governance; Establish international partnerships; Lead regional	Coordinate advanced research; Foster global collaboration; Drive	Evaluate international standing; Assess long-term impact; Update strategic

	initiatives	innovation	vision
Educational Institutions	Build research centers; Create innovation hubs; Establish global networks	Implement AI/blockchain solutions; Lead research projects; Foster global partnerships	Measure research output; Assess global impact; Evaluate sustainability
Instructors	Develop expertise in emerging technologies; Lead innovation; Build global networks	Conduct research; Apply emerging technologies; Share international best practices	Evaluate innovation impact; Measure global engagement; Assess professional growth

This matrix provides a comprehensive framework for implementing the CoMDES model, ensuring alignment between stakeholder responsibilities and the model's three-phase process while maintaining clear progression across different timeframes. Each cell represents specific activities and outcomes that contribute to the overall success of digital transformation while prioritizing ethics and safety.

3.3.2. Evaluation and Monitoring Criteria

Digital transformation in higher education must be assessed based on predetermined standards of effectiveness, ethics, and security. Assessment must be conducted on the institutional, programmatic, and operational levels, in accordance with a stipulated timeline. This guarantees a thorough review of digital transformation plans.

Strategic alignment metric assesses how well digital transformation is linked to national policy, institutional strategy, and global standards. Resource allocation, readiness of digital infrastructure, and digital resources for learners and educators are key elements. The metric guarantees that initiatives are planned in accordance with the overall objectives.

Ethical and security concerns involve protecting data privacy, following cybersecurity best practices, ensuring fair tech access, understanding the psychological effects of online learning, and being open about the use of AI. They are all central to trust and safety online.

Lastly, the effect on the quality of education measures student engagement, learning outcomes, teacher capacity, personalized learning, and online research advancement. It calculates how digitalization improves education and innovation.

All stakeholders, including academics, students, administrators, and practitioners, should be included in the evaluations. The evaluation methods can include audits, analysis of data, surveys, and benchmarking against successful online transitions. This improves the evaluation process.

Evaluation results must be made available. A rigorous evaluation system helps the higher education institutions to optimize approaches and deliver sustainable digital transformation with societal relevance. Transparency enhances accountability and quality enhancement.

3.3.3. Application Scenario: University of Social Sciences and Humanities, Vietnam National University Ho Chi Minh City

To illustrate the practical application of the CoMDES framework, consider its potential implementation at the USSH-VNUHCM. USSH-VNUHCM is actively engaged in a DT process, as evidenced by its comprehensive DT Project Plan (2021-2025) and existing regulations concerning academic integrity, data management, and a code of conduct. The CoMDES model provides a structured approach to integrate ethics and safety management explicitly within this ongoing transformation.

In the Goals phase, CoMDES would guide the USSH Rectorate and its designated DT Steering Committee to synthesize the objectives outlined in the DT Project Plan (e.g., developing a smart university, enhancing administrative efficiency, integrating data systems) with the principles enshrined in existing institutional documents. This involves explicitly mapping the ethical requirements from the Academic Integrity Regulation (Decision 10/QD-XHNV-TTPC-SHTT) (2025) and the behavioral expectations from the Code of Conduct (Decision 2222/QD-XHNV-TCCB) (2023) onto the DT goals. Furthermore, the Data Management Regulation (Decision 419/QD-XHNV-HCTH) (2024), which already defines data classification levels and responsibilities, would serve as a foundational element in setting specific,

measurable goals for data security and privacy within the DT context. The process ensures that ethical considerations and safety protocols are not afterthoughts but core components of the strategic vision.

During the Implementation phase, CoMDES provides a framework for operationalizing these integrated goals. The Analysis step would involve assessing the ethical and safety risks associated with specific DT initiatives, such as the deployment of new LMS, upgrading server infrastructure, or digitizing student records, referencing the data sensitivity levels defined in Decision 419. The Plan step would leverage existing structures, like the Team of IT and Data and the Office of Inspectorate – Legislation – Intellectual Property Rights, to develop concrete action plans. This could include defining data encryption standards for new databases, establishing clear access control protocols based on roles outlined in the Data Management regulation, and designing targeted Advanced Training modules. Training for faculty might focus on preventing plagiarism using digital tools (linking to Decision 10), while student training could emphasize responsible online behavior and data privacy (linking to Decision 2222). The defined Outcomes would focus on achieving secure system deployment, user adherence to ethical guidelines, and enhanced digital literacy across the institution.

Finally, the Result phase under CoMDES ensures continuous improvement through systematic evaluation and feedback. The Evaluation step would utilize metrics derived from system logs (e.g., monitoring access based on Decision 419's permissions), incident reports (tracking cybersecurity threats or academic integrity violations reported through channels potentially involving the Academic Integrity Council), and stakeholder surveys (gauging awareness and effectiveness of training). These findings would be analyzed to understand the real-world impact of the implemented measures. The Directions and Solutions step involves feeding this evaluation data back to the USSH leadership and relevant departments. This iterative process allows for the refinement of DT strategies, updates to regulations like the data field appendices in Decision 419 or the procedures in Decision 10, enhancement of security technologies, and adjustments to training programs, ensuring the DT process remains adaptive, effective, ethically sound, and safe.

By applying the CoMDES model, USSH-VNUHCM can leverage its existing regulatory strengths and DT momentum to build a more holistic, integrated, and proactive approach to managing the complex ethical and safety dimensions inherent in its digital transformation journey.

4. CONCLUSION

This study discusses some of the significant issues in safety and ethics management in the context of digital transformation in Vietnamese universities. The primary scientific contributions of this research are threefold. Firstly, it provides a contextualized analysis of the specific ethical and safety challenges facing Vietnamese higher education during DT, highlighting the interplay between technological adoption, human capacity, and policy gaps, substantiated by indicative empirical evidence from USSH-VNUHCM. This analysis adds nuance to the global discourse by focusing on the particularities of a developing country context. Secondly, the study introduces the CoMDES model, an integrated, theoretically grounded framework for managing digital ethics and safety. Its novelty lies in its holistic, multi-stakeholder approach (encompassing Educational Authorities, Institutions, and Instructors) and its process-oriented structure (Goals, Implementation, Result), offering a significant advancement over piecemeal or purely technology-focused solutions. This model serves as both a diagnostic tool and a strategic guide for educational management practice in the DT era. Thirdly, the research demonstrates the practical applicability of integrating empirical survey data, even from a limited sample, to inform the understanding of specific challenges like perception gaps in digital safety competence and institutional readiness.

There are specific guidelines for key stakeholders. Educational Authorities must create regulatory guidelines for digital safety and ethics, supply resources for infrastructure, and set national standards for digital competences. Educational Institutions must invest in technological infrastructure, create data protection policies, and launch training programs in digital literacy and cybersecurity. Instructors are required to develop online teaching competencies, uphold professional ethics, and facilitate the creation of safe online learning environments.

While the CoMDES model and the analysis offer valuable insights for policymakers, institutional leaders, and educators seeking to foster responsible DT, the study acknowledges its limitations, particularly the small, purposive nature of the survey sample. Building upon this foundation, several critical directions for future research are proposed. First and foremost is the need for empirical validation and refinement of the CoMDES model through pilot implementations and

case studies across a diverse range of Vietnamese higher education institutions. This would test its effectiveness, adaptability, and scalability in different contexts. Second, in-depth investigations into specific emergent ethical and safety issues are warranted, such as the governance of AI in teaching and assessment, the efficacy of different cybersecurity training approaches for faculty and students, and the development of robust data privacy protocols for integrated digital learning environments within the Vietnamese legal and cultural context. Third, future research should focus on developing and validating context-specific instruments for measuring digital safety competence, ethical digital citizenship, and institutional maturity in managing DT risks, moving beyond reliance on general perceptions. Fourth, comparative studies analyzing DT ethics and safety management strategies across Southeast Asian nations could yield valuable cross-contextual learnings and identify potential areas for regional collaboration. Finally, longitudinal research is essential to track the evolving nature of digital risks and the long-term impact of ethical and safety interventions as DT continues to reshape the higher education landscape in Vietnam.

As we stand on the brink of a new age of higher education, the findings of this research illuminate the path forward to an auspicious and attainable future. Like a digital phoenix from the ashes of outdated methodologies, Vietnamese higher learning institutions can be redesigned, their wings fortified by security protocols and ethical guidelines. The CoMDES model is a beacon that navigates institutions through the turbulent waters of digital transformation into a horizon where technology and humanity sway in balance. In this future, every click, every digital engagement, weaves a strand into a fabric of learning that is not just innovative but ethically sound and secure. The road forward will likely be difficult, yet like the sun at dawn piercing clouds after a tempest, the prospect of a brighter, more equitable digital educational horizon calls us onward.

Acknowledgement

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TRENDS AND CHALLENGES IN VOCABULARY MEASUREMENT RESEARCH IN KOREAN LANGUAGE EDUCATION

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ABSTRACT

Around the year 2000, with the rapid increase in Korean language education, there was also a rise in interest and demand for learning Korean, and research on Korean language education targeting overseas Koreans and both foreign and domestic learners also increased. These studies focused on Korean language skills training (speaking, listening, reading, writing) and improving learners' Korean language proficiency. In particular, research on vocabulary education became active, with many pointing out that a lack of vocabulary creates significant communication difficulties. However, research on measuring the vocabulary ability of Korean language learners is relatively insufficient. Previous studies have proposed various methods to measure the quantity and quality of vocabulary, but there are still many gaps in the field of Korean vocabulary measurement research. This study aims to analyze the trends in research on vocabulary measurement in Korean language education and explore future tasks.

Keywords: History of research, Korean language education, vocabulary education, vocabulary measurement research

1. INTRODUCTION

With the rapid increase in Korean language education around the year 2000, interest and demand for learning Korean also grew significantly. At the same time, research related to Korean language education targeting overseas Koreans and both domestic and international learners also increased. Studies in Korean language education have covered various aspects, including training in speaking, listening, reading, and writing. Moreover, both academic research and thesis studies have primarily focused on assessing Korean language learners' proficiency to enhance their communication skills.

Despite its relatively short history, research in Korean language education has been actively conducted, leading to extensive discussions. Among these, many studies have been based on vocabulary education within the field of Korean language education. Ahn Kyunghwa (1999:167) pointed out that communication is impossible without vocabulary, and even learners who are proficient in grammar struggle to express their thoughts or comprehend information effectively if their vocabulary is insufficient. Similarly, Cho Hyun-yong (2000:142–143) reported that vocabulary is the most challenging aspect for foreign learners in communication, with difficulties occurring at more than twice the rate compared to grammar or pronunciation. Huh Yong et al. (2005:141) also emphasized that while grammar is necessary for conveying meaning, without vocabulary, no meaning can be communicated at all.

Although several studies highlight the importance of vocabulary education, research on assessing Korean language learners' vocabulary proficiency remains relatively insufficient. Previous studies on vocabulary measurement and evaluation in second-language vocabulary testing have introduced two primary assessment methods: measuring vocabulary size and evaluating the quality of vocabulary knowledge (Meara, 1996a; John Read, 2001). Discussions on vocabulary measurement tools have also been diverse. These include methods such as identifying appropriate vocabulary based on pictures or illustrations (Corrigan & Upshur, 1982; Arnaud, 1989; Jones, 2004; Smith, 2004), finding vocabulary in context (Clark, 1972; John Oller, 1972, 1979; Oller, 1975; Chihara, Oller, Weaver & Chavez-Oller, 1977), and inferring unknown vocabulary from reading or listening (Stalnaker & Kurath, 1935).

Despite the existence of various theories and models for measuring vocabulary in comprehensive Korean language education for multinational learners, there are still significant gaps in research on Korean vocabulary assessment. Given this situation, the purpose of this study is to analyze past research on vocabulary measurement in Korean language education from a historical perspective, identify trends, and explore future research directions.

2. RESEARCH SUBJECTS AND CLASSIFICATION CRITERIA

2.1. Research Subjects

This study aims to examine the trends in research on vocabulary measurement in Korean language education. To achieve this, master's and doctoral theses related to Korean vocabulary measurement from around the year 2000 onward were collected and classified. Additionally, academic journals published by organizations such as the Society of Korean Linguistics, the International Association for Korean Language Education, and the Bilingual Studies Association were analyzed.

During the review process, it was found that research on vocabulary measurement specifically targeting multinational Korean language learners remains relatively insufficient. Therefore, this study not only focuses on Korean language education but also extends its scope to research and discussions on vocabulary measurement in Korean language and literature education.

The primary reason for assessing learners' vocabulary proficiency in Korean language education and Korean language and literature education is the fundamental importance of vocabulary skills. To investigate the research history of vocabulary measurement in Korean language and literature education, this study searched and compiled research articles using the keywords "vocabulary measurement" and "vocabulary proficiency measurement" in databases such as the Korean Language Education Society, the Research Information Sharing Service (RISS), Korea Citation Index, and DBpia. The collected studies were categorized as shown in Table 1: Research Subjects and Classification.

Table 1. Research Subjects and Classification

Category		Number of Papers	
		Korean Language Education	Korean Language and Literature Education
Theses	Doctoral Dissertations	7	1
	Master's Theses	8	2
Journal Articles		32	12
Total		62	

The research subjects presented in Table 1 include master's and doctoral theses as well as academic journal articles on Korean vocabulary measurement, collected from both Korean language education and Korean language and literature education. Despite the limited number of studies specifically focused on vocabulary measurement, some research also addressed both vocabulary assessment and measurement. Since it was difficult to determine solely from the title whether a study focused on "vocabulary assessment" or "vocabulary measurement," the study reviewed the table of contents and relevant keywords to identify and classify studies that were more closely related to the field of vocabulary measurement.

2.2. Classification Criteria

The research subjects in this study were classified inductively based on the works presented in Table 1. A total of 62 studies related to vocabulary measurement in Korean language education and Korean language and literature education were identified, consisting of 8 doctoral dissertations, 10 master's theses, and 44 general journal articles.

The collected studies were categorized based on time period and type. The chronological classification was conducted in 10-year intervals 1990–2000, 2001–2010, 2011–2020 and 2020–present. The type-based classification divided the studies into master's and doctoral theses and journal articles (general research papers) published in academic journals in Korea. Refer to Table 2: Classification Criteria for a detailed categorization.

Table 2. Classification Criteria

Chronological Classification	1990~1999
	2000~2009
	2010~2019
	2020~ Present
Type-Based Classification	Doctoral Dissertations
	Master's Theses
	Journal Articles

3. ANALYSIS OF RESEARCH TRENDS IN KOREAN VOCABULARY MEASUREMENT

3.1. Research Trends by Time Period

This study analyzed research publications on Korean vocabulary measurement from 1990 to May 2024. The collected studies were categorized based on their publication period to observe trends over time. The chronological classification of the analyzed research materials is summarized in Table 3: Number of Studies by Time Period.

Table 3. Number of Studies by Time Period

Year	Journal Articles	Master's Theses	Doctoral Dissertations	Total
1990~1999	2	0	0	2
2000~2009	4	4	0	8
2010~2019	32	4	3	39
2020~ Present	6	2	5	13

Research on vocabulary measurement was initially limited, with only two studies: Im Ji-ryong (1998) in Korean language and literature education and Ahn Kyunghwa (1999) in Korean language education. However, the number of studies gradually increased in the 2000s.

From 2000 to 2009, a total of eight studies were published, including four master's theses. The number of studies grew significantly after 2010, coinciding with the global expansion of Korean language education, leading to more research focusing on multinational learners. Between 2010 and 2019, a total of 39 studies were published, consisting of 32 journal articles and seven master's and doctoral theses. From 2020 to the present, six journal articles, two master's theses, and five doctoral dissertations have been published.

3.2 Research Trends by Type

This study analyzed research publications on vocabulary measurement from 1990 to May 2023. The collected studies were categorized based on their type, distinguishing between doctoral dissertations, master's theses, and journal articles. The classification of research by type is summarized in Table 4: Number of Studies by Type.

Table 4. Number of Studies by Type

Category		Number of Papers	
		Korean Language Education	Korean Language and Literature Education
Theses	Doctoral Dissertations	7	1
	Master's Theses	8	2
Journal Articles		32	12
Total		62	

An analysis of research trends by type in Korean vocabulary measurement studies shows that journal articles account for the largest proportion, with a total of 44 papers. Among these, 32 papers are related to Korean language education, while 12 papers focus on Korean language and literature education, making up more than half of all collected studies. Additionally, 17 thesis papers were identified, including 10 master's theses and 8 doctoral dissertations.

3.2.1 General Journal Articles

Research on vocabulary measurement in general journal articles has explored various topics in both Korean language and literature education and Korean language education. In the field of Korean language and literature education, studies have addressed vocabulary assessment and measurement methods, research on vocabulary use by specific learner groups, vocabulary measurement for different language skills, and discussions on the challenges and directions of Korean vocabulary education.

Key studies on vocabulary assessment and measurement methods include Im Ji-ryong (1998), Shin Myung-seon (2015), Kim Myung-kwan (2016), Ahn Ui-jung (2018), and Lee Eun-hye (2020). While Im Ji-ryong (1998) did not focus solely on vocabulary measurement, the study outlined essential aspects of vocabulary evaluation, including its purpose, content, and methods, which can be applied to vocabulary measurement processes. According to Im (1998:14), the two

primary goals of vocabulary assessment are:

- Ensuring that individuals acquire essential vocabulary for daily communication.
- Expanding the quantity and quality of vocabulary to enhance linguistic competence within a community.

Vocabulary assessment focuses on lexical meaning and pragmatic information, and evaluation methods include the "coexistence of instruction and assessment model," the "reading comprehension assessment model," and the "test bank model."

Shin Myung-seon (2015) also structured an evaluation system based on the characteristics of vocabulary competence. However, the study identified five major limitations in the content framework for vocabulary competence evaluation:

- The evaluation content is limited to structuralist linguistic knowledge.
- The comprehensive aspects of vocabulary competence are not fully considered.
- Vocabulary items are primarily linked to reading tasks rather than other skills.
- There is no clear logical relationship between test formats and the nature of the evaluation items.
- The diversity of evaluation tools is insufficient (Shin, 2015:69).

These discussions contribute valuable insights for developing vocabulary competence evaluation and measurement tools.

Ahn Ui-jung (2018) conducted a study on idiomatic expressions and their frequency and distribution for measuring vocabulary richness. The research compiled a list of Korean idiomatic expressions and analyzed their distribution across various text types. By comparing their use in written and spoken texts, the study demonstrated how this list could be used to assess vocabulary diversity in learner output.

Studies on Specific Learner Groups and Language Skills

Studies measuring vocabulary use among specific learner groups include:

- Kim Young-ran (2007): Bilingual children
- Yeo Seung-soo & Park Yoon-jung (2015): Students with learning disabilities
- Seo Hyung-kook (2017): Middle school students
- Studies on vocabulary measurement for different language skills include:
- Ahn Ui-jung (2008): Speaking (corpus-based analysis)
- Ahn Ui-jung (2016), Seo Hyung-kook (2017): Writing (text-based analysis)

Additionally, Im Ji-ryong (2010) provided an overview of the challenges and directions of Korean vocabulary education.

Based on the number of collected studies, it is evident that vocabulary education has not received significant attention in Korean language and literature education, even for native speakers (Cho Hyun-yong, 2000). Moreover, vocabulary measurement studies have primarily focused on limited learner groups: bilingual children (Kim Young-ran, 2007; Choi Ji-young, 2017), students with learning disabilities (Yeo Seung-soo & Park Yoon-jung, 2015), and middle school students (Seo Hyung-kook, 2017). Furthermore, the focus of vocabulary measurement by language skill has been limited to speaking (corpus-based) and writing (text-based analysis), with relatively little attention given to other language skills such as listening and reading.

Table 5.Number of General Journal Articles in the Field of Korean Language and Literature Education

No.	Year	Author(s)	Title	Journal/Institution
1	1998	Im Ji-ryong	Basic Concepts of Vocabulary Assessment	Korean Language Education Research
2	2007	Kim Young-ran	Validity of Dynamic Assessment for Measuring Bilingual Children's Vocabulary Learning Ability	Korean Speech Therapy Association

3	2008	Ahn Ui-jung	Measuring and Utilizing Spoken Vocabulary Using Corpora	Ethnic Language and Literature Society
4	2010	Im Ji-ryong	Challenges and Directions of Korean Vocabulary Education	Korean Lexical Semantics Society
5	2015	Shin Myung-seon	A Study on the Content System for Evaluating Korean Vocabulary Competence	Korean Language Education Society
6	2015	Yeo Seung-soo & Park Yoon-jung	Study on the Validity of Vocabulary-Matching CBM for Students with Learning Disabilities	Korean Special Education Society
7	2016	Kim Myung-kwan	Interpretation Validity of MLU Measurement in Language Proficiency Assessment	Korean Language Education Society
8	2016	Ahn Ui-jung	A Study on Measuring the Orality of Texts for Learner Writing Education	Korean Literature and Language Society
9	2017	Seo Hyung-kook	Analysis of Variables in Measuring Middle School Students' Vocabulary Usage	Society of Korean Linguistics
10	2017	Choi Ji-young	Vocabulary Diversity of Korean-Chinese Bilingual Children	International Association for Korean Language Education
11	2018	Ahn Ui-jung	Frequency and Distribution of Idiomatic Expressions for Measuring Vocabulary Richness	Yonsei University Language Information Research Institute
12	2020	Lee Eun-hye	A Study on the Hierarchy of Subcomponents in Vocabulary Knowledge	Learner-Centered Curriculum Research Society

This table provides an overview of key general journal articles that contribute to research on vocabulary assessment and measurement within Korean language and literature education.

It is evident that various discussions have emerged in the field of Korean language education regarding vocabulary measurement. Studies on measuring the difficulty level of Korean vocabulary for foreign learners began with Ahn Kyunghwa (1999), and a total of 24 studies were collected up until 2022. As Korean language education expanded worldwide in the 2000s, the Test of Proficiency in Korean (TOPIK) also gained prominence, leading to research on vocabulary assessment and measurement in TOPIK, initiated by Cho Hyun-yong (2000).

Ahn Kyunghwa (1999) examined methods for assessing the difficulty of Korean vocabulary learning, based on the assumption that learners' errors reflect the difficulty of learning. The study analyzed learners' errors, identified their causes, and classified vocabulary types according to difficulty levels. The experiment was conducted with 60 foreign learners (excluding ethnic Koreans) enrolled in the Seoul National University Language Institute in Fall 1999, including 13 English-speaking learners and 57 non-English-speaking learners. The research tool consisted of an 80-item questionnaire, which was divided into two types of questions. The study analyzed vocabulary difficulty based on semantic categories and relationships, considering three factors: cross-linguistic transfer, semantic domains, and semantic relationships.

Cho Hyun-yong (2000) investigated whether the vocabulary section of TOPIK effectively measures vocabulary proficiency. Since TOPIK questions focus on test performance rather than actual vocabulary knowledge, the study examined synonyms, polysemy, and antonyms to determine whether vocabulary content was appropriately structured. Additionally, idiomatic expressions and onomatopoeia were analyzed to assess their role in vocabulary evaluation. Through discussions on the suitability of multiple-choice and applied question types, Cho (2000) proposed improvements in vocabulary assessment, emphasizing the importance of clear assessment objectives and reliable question formats (Won Mi-jin, 2017:26). Later, Cho (2011) further explored issues related to evaluating vocabulary proficiency, including:

- Whether vocabulary should be assessed independently
- The balance between quantitative (vocabulary size) and qualitative (vocabulary knowledge) evaluation
- Methods for assessing vocabulary comprehension and production

Expansion of Research Since 2010

Since 2010, the number and diversity of Korean learners have increased, including those majoring or minoring in Korean. Consequently, research has expanded to address different learner groups, including marriage migrants and multinational learners. Studies have also focused on vocabulary assessment by language skill and problem-solving approaches for vocabulary measurement.

Research on Marriage Migrants Studies focusing on marriage migrants include: Kim Sung-soo, Lee Sang-kyung, & Ahn Hyo-ja (2011), Kim Sun-jung (2012), Kang Seung-hee & Son Eun-nam (2013), Joo Wol-rang (2018). Among these, Kim Sung-soo et al. (2011) and Kang Seung-hee et al. (2013) collected spoken data from female marriage migrants, measuring the number of words per sentence and the number of morphemes per sentence as objective indicators of language proficiency. The results showed that morpheme-based sentence length measurements were relatively low.

Kim Sun-jung (2012) expanded this analysis by measuring both the number of morphemes per sentence and lexical diversity (LD), concluding that women in natural language acquisition environments tend to repeat words within the same word class. However, discussions on vocabulary density, infrequent word usage, and lexical sophistication remain limited. Joo Wol-rang (2018) pointed out that research on marriage migrants has mostly focused on group studies, lacking individual-level language ability assessments. To address this, the study collected written samples over six months to measure the lexical complexity of long-term resident female marriage migrants using three indicators: Lexical diversity, Lexical density, Lexical sophistication.

The study demonstrated that, like grammar acquisition, vocabulary development is not automatically acquired in natural language environments. These studies provide valuable insights for developing vocabulary education strategies for marriage migrants.

Research on Multinational Learners Key studies include: Hwang Eun-ha (2014), Jung Jin-kyung (2021), Jang Mi-mi, Wang Eok-moon, & Won Mi-jin (2022).

Hwang Eun-ha (2014) examined the effectiveness of loanwords in Korean language education, noting that little research has assessed their utility. The study used a loanword recognition test based on the Vocabulary Knowledge Scale (VKS) to examine how English-speaking beginner learners use their native language knowledge to infer Korean loanwords. The findings suggested that:

- Loanword integration can enhance vocabulary expansion.
- Loanwords serve as useful tools for linguistic and cultural education.
- Loanwords can create dynamic cultural learning experiences.

Jung Jin-kyung (2021) measured lexical richness in writing samples from Chinese, Japanese, and English learners of Korean, analyzing: Lexical diversity (LD), Lexical density, Lexical sophistication.

Jang Mi-mi et al. (2022) refined these methods by using a Korean language education-specific vocabulary list, rather than a dictionary-based vocabulary list. Instead of a self-assessment approach, a structured vocabulary test was conducted to quantify learners' vocabulary size. The study classified learners into high and low proficiency groups and analyzed the correlation between vocabulary proficiency and overall language ability. The results indicated that low-proficiency learners' vocabulary scores were more correlated with listening and reading, while high-proficiency learners' vocabulary scores had a stronger correlation with writing skills.

Studies on Vocabulary Measurement by Language Skill Key research includes: Jin Dae-young (2006), Bae Do-yong (2012), Won Mi-jin (2013, 2017), Nam Joo-yeon & Kim Young-joo (2014), Park Jung-eun & Kim Young-joo (2014), Koo Min-ji (2016, 2019), Won Mi-jin, Wang Eok-moon, & Joo Woo-dong (2017), Lee Soo-mi (2017), Oh Hae-ri (2018), Kang Jung-hee (2018), Joo Woo-dong (2019), Yoon Na-young (2020), Lee Bo-mi (2020), Yoo So-young (2022)

Vocabulary Assessment in Writing

Jin Dae-young (2006) and Won Mi-jin (2017) analyzed lexical quantity, density, level, and frequency in writing samples of advanced learners to evaluate their writing skills. Won Mi-jin (2013) applied the Vocabulary Levels Test (VLT) to measure receptive vocabulary knowledge in Korean learners. In 2017, Won conducted a Yes/No Test (YNT) on 20 advanced learners, estimating their vocabulary size at approximately 40% of the 50,000 words listed in the Korean

Basic Dictionary. However, the study had limitations, including a small sample size and reliance on self-assessment.

Vocabulary Complexity in Academic Writing

Won Mi-jin et al. (2016) analyzed vocabulary complexity in academic learners by categorizing lexical richness into three components: Lexical diversity, Lexical density, Lexical sophistication

Lee Soo-mi (2017) conducted a longitudinal study on one learner's spoken and written vocabulary development from the beginner to intermediate level. The study measured Type-Token Ratio (TTR), LD, and vocabulary frequency. Other studies by Bae Do-yong (2012), Nam Joo-yeon et al. (2017), and Kang Jung-hee (2018) analyzed lexical density by proficiency level.

These studies highlight ongoing efforts to develop effective vocabulary assessment tools for different learner groups and proficiency levels in Korean language education.

Table 6. Number of General Journal Articles in the Field of Korean Language Education

No.	Year	Author(s)	Title	Journal/Institution
1	1999	Ahn Kyunghwa	Study on the Measurement of Korean Vocabulary Learning Difficulty	Korean Linguistics Association
2	2000	Cho Hyun-yong	Research on Vocabulary Assessment in the Test of Proficiency in Korean (TOPIK)	Korean Language Education Research
3	2006	Jin Dae-young	Vocabulary as a Component of Writing Proficiency Assessment	Bilingual Studies Association
4	2011	Kim Sung-soo, Lee Sang-kyung, Ahn Hyo-ja	Analysis of Korean Vocabulary and Syntax in Speech Samples of Female Marriage Migrants	Korean Special Education Research Center
5	2011	Cho Hyun-yong	Current Status and Prospects of Korean Vocabulary Assessment	Bilingual Studies Association
6	2012	Kim Sun-jung	Characteristics of Speech by Female Marriage Migrants: Focus on Mean Length of Utterance (MLU) and Lexical Diversity	Korean Language & Literature Association
7	2012	Bae Do-yong	Study on Lexical Diversity and Density in Korean Learners' Writing	Korean Linguistics Association
8	2013	Kang Seung-hee, Son Eun-nam	Korean Vocabulary and Syntax Proficiency of Female Marriage Migrants	Korean Speech Therapy Association
9	2013	Won Mi-jin	Study on Factors Influencing Vocabulary Acquisition in Academic Korean Learners	Korean Language & Culture Education Association
10	2014	Kim Il-hwan, Lee Seung-yeon	Vocabulary Usage Patterns in Korean Language Textbooks	Korean Language Studies Association
11	2014	Nam Joo-yeon, Kim Young-joo	Measurement of Lexical Diversity in Korean Learners' Speech	Korean Lexical Semantics Society
12	2014	Park Jung-eun, Kim Young-joo	Analysis of Lexical Diversity in Advanced Korean Learners' Writing	International Korean Language Education Association
13	2014	Bae Do-yong	Issues in Measuring Lexical Richness in Korean Learners' Writing	Korean Linguistics Association
14	2014	Hwang Eun-ha	Study on the Effectiveness of Loanwords in Vocabulary Expansion	Korean Language Education Research
15	2015	Lee Yoo-rim	Factors Affecting Vocabulary Acquisition and Expression in Korean Learners	Korean Lexical Semantics Society
16	2016	Koo Min-ji	Analysis of Reading Textbooks Based on	International Korean

			Vocabulary Difficulty Measurement	Language & Culture Association
17	2017	Kim Myung-kwan	Diagnostic and Measurement Approaches for Vocabulary Proficiency in Foreign Learners	Korean Language Education Research
18	2017	Won Mi-jin	Review of Vocabulary Measurement Methods in Korean Learners	Korean Language & Culture Education Association
19	2017	Won Mi-jin, Wang Eok-moon, Joo Woo-dong	Study on Lexical Richness in Korean Learners' Writing: Possibility as a Proficiency Measurement Tool	Korean Language Studies Association
20	2017	Lee Soo-mi	Longitudinal Study on Lexical Usage in Korean Learners' Speaking and Writing	Korean Linguistics Association
21	2018	Oh Hae-ri	Study on the Relationship Between Quantitative and Qualitative Vocabulary Knowledge and Listening Comprehension in KFL Learners	Humanities Research Journal
22	2018	Kang Jung-hee	Analysis of Lexical Development and Usage Patterns in Korean Learners' Writing	Bilingual Studies Association
23	2018	Jang Yeon-ji, Kim Han-saem	Study on Measuring Lexical Refinement in Korean Learners	International Korean Language Association
24	2018	Joo Wol-rang	Lexical Complexity Measurement in Female Marriage Migrants' Writing	Korean Language & Culture Education Association
25	2019	Koo Min-ji	Study on Vocabulary Difficulty Measurement in Korean Reading Textbooks	International Korean Language Education Association
26	2019	Joo Woo-dong	Complexity and Accuracy in Korean Learners' Writing: Use of Proficiency Measurement Indicators	Learner-Centered Curriculum Research Society
27	2019	Heo Won-jin, Lee Min-woo	Vocabulary Usage Patterns by Proficiency Level in Korean Learners	Bilingual Studies Association
28	2020	Yoon Na-young	Productivity and Receptivity of Derivational Vocabulary in Korean Learners	International Korean Language & Culture Association
29	2020	Lee Bo-mi	Development of a Formula for Measuring Reading Text Difficulty in Korean	Yonsei University Language Research & Education Institute
30	2021	Jung Jin-kyung	Measuring Lexical Richness in Korean Learners: Comparison of Chinese, Japanese, and English Learners	International Linguistics Association
31	2022	Jang Mi-mi, Wang Eok-moon, Won Mi-jin	Correlation Between Vocabulary Size and Korean Proficiency in Chinese Learners	Yonsei University Language Information Research Institute
32	2022	Yoo So-young	Study on Measuring Collocational Complexity in Korean Learners	International Linguistics Association

An analysis of the general journal articles listed in Table 6 confirms that various discussions have emerged in the field of Korean language education regarding vocabulary measurement.

When assessing learners' vocabulary proficiency, many researchers have conducted studies by dividing vocabulary

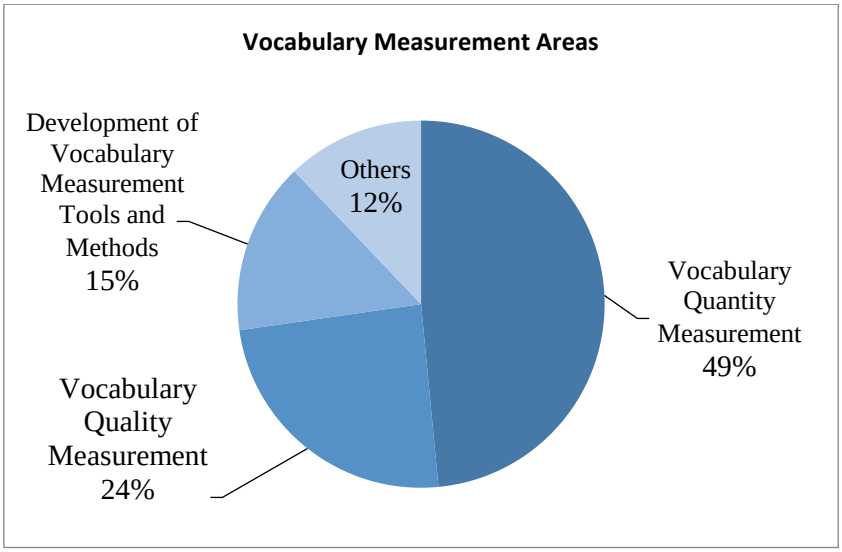
measurement into two approaches:

– Measuring vocabulary size (quantitative measurement)

– Measuring vocabulary quality (qualitative measurement)

Based on Table 6, it is evident that research on vocabulary size measurement has been the dominant trend.

Figure 1. Vocabulary Measurement Areas



As shown in Figure 1, research on vocabulary size measurement has been the most widely conducted. Other areas of study, in order of frequency, include:

– Vocabulary quality measurement

– Development of vocabulary measurement tools and methods

– Analysis of vocabulary in Korean language textbooks: Although pilot tests have been conducted to measure learners' vocabulary size, relatively few studies have focused on assessing the quality of vocabulary knowledge. This indicates a need for further research on qualitative aspects of vocabulary competence in Korean language learners.

3.2.2. Master's and Doctoral Theses:

From the late 2000s to 2023, a total of 17 master's and doctoral theses were published on vocabulary measurement. Among them, 14 were in the field of Korean language education, while three were in Korean language and literature education.

+ Korean Language and Literature Education Theses: Han Mi-jin (2005), Yang Hyo-soon (2008), Lee Ki-yeon (2012)

+ Korean Language Education Theses:

+ Master’s Theses: Kim Min-ji (2009), Park Min-jin (2009), Park Jung-eun (2014), No Kwan-ye (2016), Koo Da-young (2017), Jang Yeon-ji (2019), Kim Chae-young (2021), Lee Joo-eun (2023)

+ Research Focus and Findings

+ Many of these studies attempted to measure vocabulary proficiency using various assessment methods, often focusing on evaluating receptive vocabulary knowledge to explore the effectiveness of different learning environments and teaching methods.

+ Kim Min-ji (2009): Examined the effectiveness of semantic field-based vocabulary instruction in improving learners' vocabulary proficiency. The study assessed whether semantic field-based instruction influenced learner engagement and motivation in Korean language learning. Findings from interviews and surveys confirmed that this approach increased participation and interest in learning Korean vocabulary.

+ Park Min-jin (2009) & Kim Chae-young (2021): Investigated the effects of glossing and text modification on incidental vocabulary learning. Both studies found that providing glosses and modifying texts positively impacted

vocabulary acquisition.

+ Koo Da-young (2017): Compared lexical diversity between multicultural children and intermediate-level foreign learners using Type-Token Ratio (TTR) and D-value analysis. The study found significant differences between native speakers and both learner groups but no significant difference between multicultural children and intermediate-level foreign learners.

+ Park Jung-eun (2014) & Lee Joo-eun (2023): Focused on advanced learners, comparing heritage Korean learners and general advanced-level learners. Using TTR and MSTTR (Moving-Average TTR), the study measured lexical diversity in writing tasks across different genres. The results showed no significant differences in lexical diversity between the two groups.

These studies primarily focused on assessing the effectiveness of different teaching methodologies, rather than developing direct measurement tools for evaluating learners' vocabulary proficiency.

Table 7. List of Master's Theses on Vocabulary Measurement in Korean Language Education

No.	Year	Author	Title	University
1	2005	Han Mijin	A Study on Developing Vocabulary Assessment Items in Korean: Focusing on 10th Grade Paper Tests	Ewha Womans University Graduate School of Education
2	2008	Yang Hyosun	A Study on Developing Vocabulary Assessment Tools: Targeting Upper Elementary School Students	Yonsei University Graduate School of Education
3	2009	Kim Minji	A Study on the Effect of Meaning-Based Instruction on Vocabulary Improvement of Korean Learners	Ewha Womans University Graduate School
4	2009	Park Minjin	The Effect of Annotations on the Incidental Learning of Korean Idioms	Ewha Womans University Graduate School
5	2014	Park Jeongeun	A Study on Vocabulary Diversity through Analysis of Advanced Korean Learners' Writing	Kyung Hee UniversityGraduate School
6	2016	Noh Gwanye	A Study on the Patterns of Korean Vocabulary Usage by Chinese Learners at Different Levels	Keimyung University Graduate School
7	2019	Jang Yeonji	A Study on Measuring Lexical Sophistication in Korean Learners' Corpora	Yonsei University Graduate School
8	2017	Koo Dayoung	A Study on Lexical Diversity in the Writing of Intermediate Korean Learners: Focusing on Multicultural Family Children and Foreign Learners	Kyung Hee University Graduate School
9	2021	Kim Chaeyoung	The Effect of Text Modification on Incidental Learning of Korean Idioms	Ewha Womans University Graduate School of International Studies
10	2023	Lee Jueun	The Impact of Target Language Contact on Lexical Diversity in Advanced Korean Learners' Writing	Kyung Hee University Graduate School

Doctoral dissertations on vocabulary measurement include studies by Lee Eun-ha (2014), Ryu Han-lei (2017), Kang Jung-hee (2020), Hwang Ji-yoo (2020), Yan Shuai (2021), Kang Hye-rim (2022), and Yoo So-young (2022).

– Lee Eun-ha (2014) designed, implemented, and validated measurement tasks to assess implicit and explicit grammatical knowledge in Korean learners. The study applied the subjective threshold criterion—used in the field of cognitive psychology's implicit learning paradigm—to the measurement of second language implicit and explicit

grammar knowledge to determine whether this criterion effectively distinguishes between the two types of knowledge.

– Ryu Han-lei (2017) examined the variation in proficiency levels observed during the interlanguage development process of Chinese Korean learners. The study analyzed how complexity, accuracy, and fluency (CAF) influenced variations in proficiency and categorized the characteristics of interlanguage variation. To collect research data, 10 Chinese learners of Korean were selected, and their writing samples were collected at different stages over a period of 2.5 years per individual and 4.5 years in total. The study tracked their Korean proficiency development from the beginner to advanced levels through a detailed analysis of their written output.

– Kang Jung-hee (2020) and Kang Hye-rim (2022) investigated factors influencing vocabulary proficiency in Korean learners by measuring lexical richness in their written texts. Their studies analyzed lexical diversity, lexical density, lexical sophistication, and lexical accuracy to assess how these factors were affected by learner proficiency, linguistic background, and academic achievement. Additionally, the studies explored the relationship between lexical use and different writing genres, providing insights into how Korean learners utilize vocabulary in various textual contexts.

Table 8. List of Doctoral Dissertations on Vocabulary Measurement in Korean Language Education

No.	Year	Author	Title	University
1	2012	Lee Kiyeon	A Study on the Content of Korean Vocabulary Assessment	Seoul National University Graduate School
2	2014	Lee Eunha	Task Validation Study for Measuring Implicit and Explicit Knowledge of Korean Learners	Ewha Womans University Graduate School of International Studies
3	2017	Liu Hanlei	A Study on the Interlanguage of Chinese Korean Learners, Focusing on Vocabulary	Yonsei University Graduate School
4	2020	Kang Jeonghee	A Study on the Vocabulary Ability of Korean Learners: Focusing on Lexical Richness in Writing Texts	Dongguk University Graduate School
5	2020	Hwang Jiyu	A Study on the Design of Measurement Tools for Korean Speaking Assessment: Focusing on Scoring and Task Design	Yonsei University Graduate School
6	2021	Yan Shuai	A Study on Factors Influencing Vocabulary Acquisition of Chinese Korean Learners: Focusing on Beginner and Intermediate Learners	Dongshin University Graduate School
7	2022	Kang Hyerim	Development of a Formula for Measuring Orality in Texts for Korean Writing Assessment	Dong-A University Graduate School
8	2022	Yoo Soyoung	A Study on Korean Learners' Collocation Usage Ability: Focusing on the Measurement of Complexity and Accuracy	Yonsei University Graduate School

A notable feature of these studies is that experimental research on vocabulary measurement has primarily focused on assessing receptive vocabulary knowledge to evaluate the effectiveness of different learning environments and vocabulary teaching methods.

Additionally, most studies in the field of vocabulary measurement have predominantly focused on quantitative aspects, such as lexical diversity, lexical richness, and lexical density, rather than qualitative vocabulary assessment. This trend highlights a strong emphasis on measuring vocabulary size rather than depth of vocabulary knowledge.

4. FUTURE DIRECTIONS FOR RESEARCH ON KOREAN VOCABULARY MEASUREMENT

Thus far, research on Korean vocabulary measurement has primarily focused on evaluating learners' vocabulary proficiency by analyzing their written and spoken outputs. While studies have emphasized the importance of vocabulary education, research specifically on measuring the vocabulary proficiency of Korean learners remains relatively limited.

As discussed earlier, various studies have explored vocabulary measurement tools and methods, as well as efforts to

assess learners' vocabulary proficiency. However, there is still a lack of comprehensive research that examines the entire vocabulary development process from beginner to advanced proficiency levels. Most studies tend to focus on measuring vocabulary size, while research specifically aimed at measuring vocabulary quality is still insufficient. Since learners must not only know a large number of words but also use them accurately and effectively, future studies should emphasize both quantitative (vocabulary size) and qualitative (vocabulary depth) aspects of vocabulary measurement.

With the increasing global spread of the Korean language, more learners are choosing Korean as a second or foreign language. As a result, the diversity of learners is expanding, offering opportunities to broaden research subjects. However, existing studies have mainly focused on learners from Chinese, Japanese, and English-speaking backgrounds, which share some linguistic or cultural similarities. Future research should extend beyond these groups and explore learners from different linguistic and cultural backgrounds.

There are still many challenges to achieving an ideal system for vocabulary assessment and measurement. These include:

- Conducting a thorough review of the current status and practices of vocabulary measurement.
- Defining the scope and depth of vocabulary for teaching and assessment.
- Developing assessment tools that accommodate diverse learning contexts.
- Establishing a cohesive connection between vocabulary education and assessment to ensure they complement each other (Im Ji-ryong, 1998).

Addressing these issues will contribute to the advancement of vocabulary measurement research and enhance vocabulary education for Korean learners worldwide.

5. CONCLUSION

This study examined research on vocabulary measurement in Korean language education and Korean language and literature education, categorizing studies by time period and research type. A total of 62 studies were analyzed, including 8 doctoral dissertations, 10 master's theses, 44 general journal articles. The collected studies were classified chronologically into four time periods 1990–2000, 2001–2010, 2011–2020, 2020–present. They were also categorized by type, distinguishing between master’s and doctoral theses and general journal articles.

The findings show that Korean language education studies on vocabulary measurement significantly outnumber those in Korean language and literature education. Among the collected research, general journal articles (44 studies) were the most prevalent, reflecting a dominant trend toward measuring vocabulary size rather than quality. Specifically, of the 44 journal articles, 32 studies focused on Korean language education, while 12 studies were related to Korean language and literature education, comprising more than half of all vocabulary measurement research in this study.

Additionally, 17 theses were identified, including 10 master's theses and 8 doctoral dissertations. Most of the research has been conducted on an individual basis, highlighting a need for broader-scale, collaborative studies. In the future, a more comprehensive and validated approach should be developed to assess and measure vocabulary proficiency across diverse learner groups and proficiency levels in Korean language education.

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IT HUMAN RESOURCE INFRASTRUCTURE FOR FINTECH: A VIETNAMESE BUSINESS PERSPECTIVE

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ABSTRACT

The financial technology (FinTech) sector has rapidly emerged as a transformative force, revolutionizing the delivery of financial services worldwide. This paper examines the current state and emerging trends in the global and Vietnamese FinTech markets, emphasizing the critical role of information technology (IT) talent infrastructure and the alignment between education and industry needs. Vietnam's FinTech market has seen remarkable expansion, supported by innovations in digital payments, blockchain, and artificial intelligence (AI). Despite these advancements, a persistent gap exists between the skills imparted through FinTech education programs and those required by the industry. Vietnamese universities have initiated efforts to address this gap by offering specialized courses and collaborating with industry leaders, but these measures often lack sufficient practical exposure, interdisciplinary learning, and global competencies. This paper underscores the importance of bridging this divide through enhanced curricula, deeper academia-industry collaboration, and the integration of international best practices. The findings highlight opportunities for Vietnam to strengthen its FinTech talent pipeline and sustain its position as a regional leader in digital finance innovation. Future research should focus on evaluating educational outcomes, industry feedback, and the evolution of workforce requirements to ensure continued alignment with market needs.

Keywords: FinTech, education, IT talent infrastructure

1. INTRODUCTION

The financial technology sector has emerged as a transformative force in the global financial landscape, redefining how financial services are delivered and consumed. Characterized by rapid technological advancements and innovative solutions, FinTech has experienced significant growth despite challenges such as fluctuating investments and global economic uncertainties. Projections indicate that the sector will continue its robust expansion, with annual revenues expected to reach $1.5 trillion by 2030, underscoring its critical role in shaping the future of financial services. [2]

Vietnam, as one of Southeast Asia's fastest-growing FinTech markets, exemplifies this global trend. With over 200 FinTech companies as of 2022, up from just 39 in 2015, the sector has become a cornerstone of the country's economic modernization. [5]

Innovations in digital payments, blockchain, AI, and green finance have propelled Vietnam to the forefront of regional FinTech development, positioning it as a hub for technological innovation and financial inclusion. Notably, digital payment systems have experienced explosive growth, with QR code transactions rising by over 892% in volume in early 2024 compared to the previous year. [17]

However, this rapid expansion has brought to light significant challenges, particularly in aligning educational training with industry demands. Vietnamese universities have introduced specialized FinTech programs, but a persistent gap remains between the skills imparted to students and those required by the industry. Addressing this disparity is essential for sustaining the sector's momentum and ensuring Vietnam's competitive positioning in the global FinTech ecosystem.

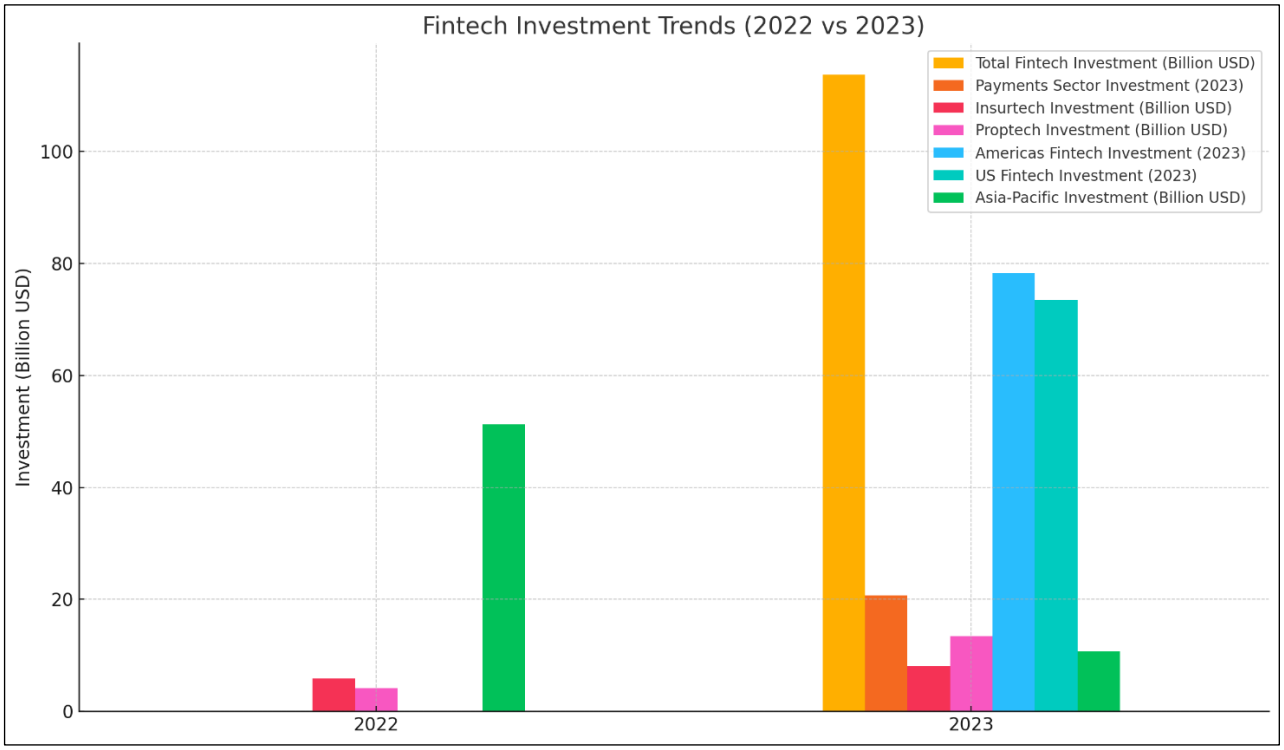
This study explores the current state of the FinTech market and trends in Vietnam, the role of IT talent in driving innovation, and the critical alignment between education and industry needs. By analyzing these dimensions, the research aims to highlight opportunities for fostering a robust FinTech ecosystem and propose strategies to bridge existing gaps.

2. FINTECH MARKET AND EMERGING TRENDS

2.1. Global Trends in FinTech

The global fintech industry has experienced significant fluctuations in recent years, influenced by various macroeconomic and geopolitical factors. In 2023, total fintech investment declined to $113.7 billion across 4,547 deals, marking the lowest figures since 2017. This downturn is attributed to challenges such as high-interest rates, persistent inflation, and geopolitical conflicts, which have led investors to exercise increased caution. Despite the overall decline, certain fintech subsectors have demonstrated resilience. For instance, the payments sector continued to attract substantial investment, accounting for $20.7 billion in 2023. Additionally, insurtech and proptech sectors experienced year-over-year investment growth, with insurtech rising from $5.9 billion to $8.1 billion, and proptech increasing from $4.1 billion to $13.4 billion. Geographically, the Americas maintained a dominant position, securing $78.3 billion in fintech funding, with the United States contributing $73.5 billion. In contrast, the Asia-Pacific region witnessed a significant decline, with investments dropping from $51.3 billion in 2022 to $10.8 billion in 2023. Looking forward, the fintech industry is expected to undergo substantial growth. Projections indicate that annual fintech revenues could reach $1.5 trillion by 2030, representing a sixfold increase. Notably, the Asia-Pacific region is poised to become the world's leading fintech market by 2030, driven by a projected compound annual growth rate (CAGR) of 27%. [8]

Picture 1: Fintect Investment Trends (2022 vs 2023)



Source: KPMG International. (2024). Pulse of Fintech H2 2023. Retrieved from https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2024/02/pulse-of-fintech-h2-2023.pdf

In summary, while the global fintech market faced notable challenges in 2023, leading to a contraction in investments, the sector's long-term growth prospects remain robust. The anticipated expansion, particularly in the Asia-Pacific region, underscores the dynamic nature of fintech and its pivotal role in shaping the future of financial services. [2]

2.2. Vietnam's FinTech Landscape

Vietnam's fintech sector has undergone remarkable growth in recent years, becoming a critical component of the country's economic modernization. With over 200 fintech companies as of 2022, up from just 39 in 2015, the industry reflects Vietnam's commitment to leveraging digital technology to drive financial inclusion and economic resilience. The market is projected to grow from USD 19.98 billion in 2025 to USD 50.20 billion by 2030, with a compound annual growth rate of 20.23%. This robust expansion underscores Vietnam's status as a burgeoning hub for fintech innovation in Southeast Asia, supported by favorable demographics, increasing smartphone penetration, and government policies aimed at fostering digital transformation. [13]

Ninety per cent of Vietnamese bank transactions are completed via digital channels. In fact, many basic banking services, like bank account openings, deposits, and money transfers, have been completely digitised. Additionally, around

40 banks opened 35 million accounts through electronic know-your-customer in 2023. Fintech is going to continue to lead the charge for the digital economy's development in the near future too, reaching $45billion in the next year, according to research from Google, Temasek and Bain & Company. Vietnam's fintech sector is experiencing the second-highest growth rate (behind Singapore) in the ASEAN region. Additionally, by the end of 2024, the country is expected to have a digital valuation of $18 billion. [17]

Besides, digital payments remain at the forefront of Vietnam's fintech landscape, with non-cash payment transactions growing by 63.3% in volume and 41.45% in value in January 2024 compared to the previous year. QR code payments have also gained traction, increasing by over 892% in volume and 1,062% in value during the same period. These trends highlight the importance of IT resources in developing seamless, secure, and scalable digital payment systems to accommodate this explosive growth. [17]

In addition to payments, Vietnam's fintech ecosystem has seen significant advancements in digital banking, wealth management, and blockchain technologies. Many banks and fintech firms are investing in AI and ML to enhance customer experiences through personalized financial products and predictive analytics. IT teams are at the heart of these initiatives, using their expertise to integrate AI and ML into fintech platforms effectively. [6]

Green finance is another emerging trend, aligning Vietnam's fintech development with global sustainability goals. IT professionals play a vital role in creating digital tools that support carbon credit trading, green bonds, and other environmentally responsible financial products. Such initiatives reflect Vietnam's ambition to integrate sustainable practices into its financial ecosystem while leveraging its robust IT infrastructure. [1]

3. THE ROLE OF IT HUMAN RESOURCES IN FINTECH

3.1. Global IT Talent Infrastructure for FinTech

The rapid expansion of the global financial technology sector has underscored the critical importance of robust IT talent infrastructure. Fintech companies are increasingly reliant on skilled IT professionals to drive innovation, ensure cybersecurity, and maintain competitive advantage. The demand for such talent has surged, with tech roles within fintech experiencing a 182% growth - three times the pace of the general market. Notably, one in three new hires in fintech globally is a software engineer or developer, highlighting the sector's dependence on specialized IT expertise. [15]

However, this rapid growth has led to a global talent shortage, posing significant challenges for the industry. Fintech hubs worldwide are competing for a limited pool of qualified professionals, intensifying the need for effective talent acquisition and retention strategies. To address these challenges, companies are adopting innovative approaches, such as expanding access to top talent through global recruitment and leveraging technology to streamline HR processes. [11]

Human resources (HR) departments within fintech firms play a pivotal role in this context. Beyond traditional functions, HR is tasked with fostering a culture of innovation, ensuring compliance with evolving regulations, and implementing strategies to attract and retain top-tier IT talent. This includes offering competitive compensation, providing opportunities for professional development, and creating an engaging work environment that appeals to tech professionals. [18]

In summary, the success and sustainability of the global fintech industry are intrinsically linked to the strength of its IT talent infrastructure. Addressing the current talent shortage through strategic HR initiatives and innovative recruitment practices is essential for maintaining the sector's growth trajectory and its ability to drive financial innovation.

3.2. Vietnam's IT Talent Infrastructure for FinTech

A pivotal factor in the rapid development of fintech in Vietnam is the strong emphasis on IT resources, particularly human resource infrastructure. Skilled IT professionals are essential for driving innovation, enabling the development of advanced digital payment systems, and ensuring robust cybersecurity measures. Platforms like MoMo, ZaloPay, and Moca, which dominate the digital payments sector, rely on IT teams proficient in software development, cloud computing, and blockchain technology. These resources are indispensable for creating secure, scalable, and user-friendly fintech solutions. [13]

IT resources are also integral to emerging fintech trends. Peer-to-peer (P2P) lending platforms and digital banking innovations depend on IT expertise to develop platforms that are both secure and efficient. Moreover, blockchain

technology applications, such as decentralized finance (DeFi) and asset tokenization, highlight the growing need for IT professionals skilled in distributed ledger technologies. The implementation of AI and ML in fintech platforms to deliver predictive analytics and personalized services further underscores the critical role of IT talent. [13]

Vietnam's emphasis on IT infrastructure development is equally important. Robust digital infrastructure, including high-speed internet and reliable network systems, supports the expansion of digital payment platforms and blockchain solutions. These investments facilitate the scalability and interoperability of fintech applications, ensuring seamless financial services for users. Additionally, IT professionals play a vital role in integrating sustainable practices into financial systems, such as green finance tools for carbon trading and eco-conscious investment products.

The strategic development of IT resources not only addresses the challenges of rapid fintech growth but also ensures Vietnam's competitive positioning in the regional fintech ecosystem. The country's focus on enhancing IT human resource capacity and infrastructure is fundamental to the continued advancement of its fintech industry.

Vietnam's fintech sector has witnessed remarkable growth, significantly impacting the demand for skilled IT professionals. The number of fintech startups in Vietnam surged by over 180% between 2018 and 2022, reflecting the sector's rapid expansion. [9]

This growth has led to a substantial increase in the need for IT talent. In 2024, Vietnam's IT industry required approximately 500,000 IT personnel; however, the available workforce could only meet around 300,000 of these positions, highlighting a significant talent gap. [3]

The fintech industry's expansion has not only created new businesses but also generated numerous job opportunities and titles, underscoring its role as a catalyst for employment in Vietnam. [4]

Furthermore, the digital payments segment is projected to reach 46.87 million users by 2028, indicating a sustained demand for IT professionals to develop and maintain these platforms. [16]

4. ALIGNING FINTECH EDUCATION WITH INDUSTRY NEEDS IN VIETNAM

4.1. Current State of FinTech Education in Vietnam

Vietnam's fintech education landscape is evolving in response to the rapid growth of the financial technology sector, but it remains at a nascent stage and faces several structural limitations. Over the past few years, a number of Vietnamese universities have taken steps to introduce specialized FinTech programs aimed at aligning academic training with the emerging needs of the industry.

Several notable institutions have launched dedicated programs:

- National Economics University (NEU) offers a Bachelor of Science in FinTech, focusing on subjects such as digital banking, blockchain applications, and financial data analytics. [14]
- Van Lang University (VLU) has introduced a FinTech undergraduate program that integrates financial theory with information technology, aiming to train human resources for the digital finance sector. [20]
- Vietnam National University (VNU) has approved a combined Bachelor-Master program in Financial Technology and Digital Business, emphasizing interdisciplinary learning in finance, technology, and innovation. [7]
- Banking University HCMC (BUH) have also added FinTech modules within the Master's training program in Finance and Banking. [19]

Despite these advancements, the reach of FinTech education remains geographically limited. Most of these programs are concentrated in Hanoi and Ho Chi Minh City, restricting access for students in other provinces and exacerbating regional disparities in talent development.

Another challenge lies in the interdisciplinary nature of FinTech education. Although FinTech inherently requires both technological and financial expertise, many programs still struggle to achieve this balance. Some students graduate with strong financial knowledge but lack IT skills, while others are proficient in programming and data but have limited financial literacy. Core technical subjects like Linear Algebra, crucial for AI and machine learning in finance, are often underemphasized.

Collaboration between universities and the FinTech industry has shown promise but remains inconsistent. For

example, MoMo and ZaloPay have established internship pipelines and project-based collaborations with institutions like NEU, offering students hands-on experience in real FinTech environments. However, these partnerships are often ad hoc and not embedded in curriculum frameworks, reducing their long-term impact. [12], [21]

Moreover, a 2022 report from Ly Thi Tran et al. (2022) on graduate employability in Vietnam indicated that students feel underprepared for real-world FinTech roles due to limited exposure to industry projects and a lack of soft skills such as communication and critical thinking. Language proficiency, particularly in English, is also a concern. FinTech is a global field, and Vietnamese graduates with limited English competency find it challenging to access international learning resources or compete in cross-border job markets. [10]

Finally, despite efforts in capacity building, the supply of FinTech-ready graduates still lags behind demand. According to a 2025 report of Chris Ng (2025) , Vietnam's IT industry needed approximately 500,000 personnel, but only 300,000 qualified individuals were available creating a gap that directly affects the growth of FinTech, which heavily depends on digital infrastructure and human capital.[3]

In summary, while FinTech education in Vietnam has made meaningful progress through new program offerings and tentative industry partnerships, it still faces challenges in accessibility, curriculum integration, and workforce readiness. A more systematic and inclusive approach supported by stronger collaborations between academia, government, and industry is needed to cultivate a generation of professionals capable of driving Vietnam's fintech revolution forward.

4.2. Industry Requirements in Vietnam's FinTech Sector

The FinTech industry in Vietnam is characterized by rapid growth and a high demand for skilled professionals to support the expansion of digital payment platforms, blockchain initiatives, and AI-driven financial services. Companies such as MoMo, ZaloPay, and Timo are leading the market, creating a strong demand for roles like Blockchain Developers, Cybersecurity Specialists, and Financial Systems Analysts.

The industry requires a blend of technical expertise and business acumen. Proficiency in programming languages such as Python and Java, along with knowledge of blockchain technology, data analytics, and regulatory compliance, are critical technical skills for FinTech professionals. Additionally, the dynamic and collaborative nature of FinTech work environments demands strong problem-solving abilities, effective communication, and teamwork skills.

Despite the growing demand, there is a notable talent gap in Vietnam's FinTech industry. Many graduates lack the practical experience and interdisciplinary knowledge necessary to excel in these roles. Industry leaders have expressed concerns about the insufficient emphasis on real-world problem-solving in academic programs, leaving graduates underprepared for the fast-paced and innovative FinTech sector.

Furthermore, the global nature of FinTech requires professionals who can operate seamlessly across international markets. While some candidates possess strong technical skills, their limited English proficiency and inadequate understanding of global FinTech trends hinder their ability to thrive in multinational companies. These factors highlight the misalignment between the current state of education and the needs of the FinTech industry in Vietnam.

4.3. Analysis and Discussion

The comparison between FinTech education and industry needs in Vietnam highlights a significant disparity. While universities have made notable efforts to introduce specialized FinTech programs, these initiatives are still insufficient to meet the immediate and dynamic demands of the industry. The FinTech sector is growing rapidly, with companies like MoMo, ZaloPay, and Timo driving innovation and requiring a workforce skilled in blockchain, AI, data analytics, and regulatory compliance. However, the talent pool provided by universities lacks the depth and breadth needed to address these technical and business needs.

One of the critical gaps lies in the limited practical exposure provided by academic programs. While collaborations between universities and industry leaders exist, they are often fragmented and do not provide consistent, hands-on training opportunities such as internships or real-world problem-solving projects. This results in graduates who may have theoretical knowledge but are underprepared for the fast-paced and innovative FinTech environment.

Another key issue is the lack of interdisciplinary learning. Many programs either focus heavily on technical skills or financial knowledge, failing to integrate the two comprehensively. For instance, technical roles like Blockchain Developer

or Cybersecurity Specialist require not only programming expertise but also an understanding of financial systems and regulatory frameworks. Graduates often fall short in bridging this gap, which is a critical requirement for FinTech roles.

Additionally, global competitiveness is hindered by inconsistent English proficiency among graduates. As FinTech increasingly operates on a global scale, strong communication skills in English are essential for engaging with international stakeholders and accessing opportunities in multinational firms. Furthermore, foundational subjects like Linear Algebra, crucial for advanced technologies like AI and machine learning, are underemphasized in many curricula, leaving students ill-equipped for cutting-edge innovations.

The industry's feedback reinforces these gaps, with employers citing a lack of job-ready graduates who can seamlessly transition into roles that require both technical expertise and adaptability to evolving market trends. The mismatch between the skills taught and those required by the industry presents a significant challenge to the FinTech sector's growth.

To address these challenges, long-term strategies should focus on systemic improvements in FinTech education. Universities need to enhance their curricula to integrate practical learning experiences and interdisciplinary training comprehensively. Expanding partnerships with FinTech companies for internships, industry projects, and mentorship programs will bridge the gap between academic knowledge and practical application.

Additionally, embedding global competencies such as English language proficiency and knowledge of international FinTech trends into programs is crucial. Strengthening foundational subjects like Linear Algebra will equip students to tackle advanced topics like AI and machine learning, preparing them for future industry demands.

Regular feedback loops with industry stakeholders, alumni tracking systems, and benchmarking against global best practices can ensure continuous curriculum alignment. By addressing these gaps, Vietnamese universities can create a robust talent pipeline that meets both immediate and long-term needs, positioning the country as a competitive player in the global FinTech landscape.

5. CONCLUSION

The analysis highlights a significant misalignment between FinTech education and industry needs in Vietnam. While universities have introduced specialized programs in blockchain, AI, and digital payments, these initiatives fall short in providing the practical exposure, interdisciplinary learning, and global competencies demanded by the rapidly evolving FinTech sector. The industry requires a workforce equipped with technical expertise, business acumen, and advanced skills in areas like cybersecurity and data analytics, which current academic training does not fully address.

To bridge this gap, a long-term collaborative approach is essential, focusing on curriculum enhancement, deeper partnerships with industry leaders, and the integration of global best practices. Such efforts can help Vietnam develop a robust FinTech talent pipeline, fostering its position as a regional leader in digital finance innovation.

Future studies should explore the effectiveness of current FinTech education initiatives by analyzing metrics such as graduate employability, industry feedback, and alumni career trajectories. Additionally, research could investigate the impact of interdisciplinary and practical learning methods, such as internships and industry-driven projects, on student preparedness. Comparative studies with FinTech education systems in leading countries can provide valuable insights into best practices and innovative approaches for aligning education with industry needs. Finally, longitudinal studies tracking the evolution of FinTech workforce requirements and education adaptations in Vietnam will help ensure sustainable alignment over time.

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FACTORS AFFECTING ORGANIZATIONAL PERFORMANCE OF SMES IN HO CHI MINH CITY: THE MEDIATING ROLE OF DIGITAL TRANSFORMATION CAPABILITY

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ABSTRACT

In economic development in the digital age, setting digital transformation goals is inevitable, it directly impacts and puts pressure on the development trend of enterprises. The objective of this study is to identify factors affecting the organizational performance of small and medium enterprises in Ho Chi Minh City through the mediating role of digital transformation capacity. This study uses qualitative and quantitative research methods. Using SPSS 26.0 and AMOS 24.0 software for analysis, data was collected from 359 valid survey questionnaires at 40 small and medium enterprises in Ho Chi Minh City. The research results show that 07 factors affect organizational performance including: (1) Leadership; (2) Digital business strategy; (3) Employee capacity; (4) Corporate culture; (5) Technology platform; (6) Pressure on enterprises; (7) Digital transformation capacity. In particular, digital transformation capacity emphasizes the positive mediating role in the relationship between factors and organizational performance of small and medium enterprises in Ho Chi Minh City. This shows that digital transformation is considered a core solution, a necessary turning point for small and medium enterprises to improve their capacity, strengthen their competitive advantage and develop sustainably.

Keywords: *"digital transformation", "organizational performance", "digitalization", "digital application", "digital operations", "small and medium enterprises"*

I. INTRODUCTION

Digital transformation is a critical aspect of operations for businesses and nations globally. It encompasses a series of activities and comprehensive processes that leverage digitalization at an advanced level to develop new working methods and approaches. The transformation typically unfolds through three stages: digitalization, digital application and operations, and full digital transformation. Theoretically, several studies have examined digital transformation strategies within enterprises (e.g., Vial, 2019; Cortellazzo et al., 2019), while others have focused on factors influencing digital transformation (e.g., Mihardjo et al., 2019; Abbu et al., 2020; S.-Y. Lee, 2021; Rodrigues, 2023; Zhang et al., 2023; Kusuma et al., 2024).

Digital transformation has driven profound changes in societies and industries through the adoption of digital technologies, attracting increasing attention from both researchers and practitioners (Vial, 2019). Moreover, the Fourth Industrial Revolution has significantly accelerated internet-based commercial transactions, making digital transformation not just an option but a necessity for businesses to remain competitive. Putthiwat et al. (2021) identified key critical success factors of digital transformation, thus broadening the understanding of its driving forces and their potential impact on business sustainability. Each organization, depending on its unique context and capabilities, must understand the factors influencing digital transformation in order to develop appropriate strategies for innovation and improvement throughout the various stages of the process (Nguyen Thi Kim Anh et al., 2022). Leaders who spearhead digital transformation efforts must ensure their organizations can effectively navigate disruptions linked to the adoption of digital technologies, while also fostering the widespread dissemination of knowledge to achieve significant innovation performance (Kusuma et al., 2024). Additionally, maintaining quality control during digital transformation, based on a strong foundation of digital knowledge, can foster innovation in both production and business operations.

Ho Chi Minh City is a vibrant and rapidly developing metropolis with aspirations to become an international financial center. However, alongside these opportunities, Vietnamese enterprises particularly small and medium-sized enterprises

(SMEs) in Ho Chi Minh City face significant challenges posed by the Fourth Industrial Revolution. Many businesses struggle with where to begin, lack awareness and access to digital technology, and hesitate to invest in IT infrastructure. This highlights the urgent need to study the factors affecting digital transformation capabilities and organizational performance in SMEs.

This article provides an overview of digital transformation, identifies key factors influencing an enterprise's ability to transition digitally and improve performance, and offers recommendations. These include support from the government and local authorities, as well as proactive efforts from businesses themselves, to enhance the success rate of digital transformation among SMEs in Ho Chi Minh City.

II. MATERIAL AND METHODOLOGY

2.1. Conceptual Foundation

Leadership

Changes in leadership mindset and actions play a crucial role in shaping a business's digital transformation capabilities. These changes encompass the rapid optimization of decision-making processes, enabled by instant access to information and open data, along with significant shifts in leadership learning and development approaches. To successfully guide their organizations through digital transformation, leaders must proactively cultivate a digital mindset (**Kusuma et al., 2024**).

Digital Business Strategy

Kusuma et al. (2024) argue that information technology plays a vital role in business operations. Beyond its traditional function of supporting management, it has evolved into a core component of business strategy development. The process of formulating and executing business strategies to achieve long-term goals through digital technology is referred to as a digital business strategy.

Employee Competency

Digital transformation demands that employees and managers adopt faster, more accurate, and highly efficient approaches to task execution. Consequently, employees must develop competencies that enable them to adopt, develop, and utilize emerging technologies to enhance their performance. Furthermore, depending on specific business contexts, both employees and managers must foster adaptability and the capability to effectively leverage network systems and digital connectivity (**Zhang et al., 2023**).

Corporate Culture

Digital transformation necessitates a corporate culture that prioritizes continuous data verification and sharing (**Zhang et al., 2023**). This shift requires a high level of transparency in both work activities and business processes, alongside fostering a data-driven mindset among employees. Nevertheless, digital transformation can also trigger cultural conflicts: while younger employees tend to be more technologically adept but lack industry experience, older employees often possess extensive expertise yet may struggle to adapt to rapid technological advancements (**Rodrigues, 2023**).

Technology Platforms

Digital transformation fundamentally reshapes work structures, job roles, and workplace requirements. In particular, digital interconnectivity fosters the formation of cross-functional teams across the enterprise, gradually replacing traditional hierarchical structures and creating new opportunities beyond organizational boundaries (H. Abbu and G. Gopalakrishna (2020). Mićić et al. (2022) argue that a digital workplace should be oriented, adaptable, and evolving in line with the development of technologies and labor legislation.

Pressure on Businesses

Digital transformation has become a critical factor for small and medium-sized enterprises (SMEs) to remain competitive in the digital era. According to a study by Kumar et al. (2024), SMEs face significant challenges in adopting digital technologies due to limited resources and technical barriers. However, embracing digital transformation enables SMEs to improve performance, spur innovation, enhance productivity, and compete on a more even footing with larger firms. The study emphasizes the importance of digital literacy and organizational competence in overcoming these

challenges and achieving successful digital transformation.

Digital Transformation

Digital transformation is a critical factor for small and medium-sized enterprises (SMEs) to remain competitive in the digital era. According to a study by Kumar et al. (2024), SMEs face significant challenges in adopting digital technologies due to limited resources and technical barriers. However, embracing digital transformation enables SMEs to improve performance, spur innovation, enhance productivity, and compete on a more even footing with larger firms. The study emphasizes the importance of digital literacy and organizational competence in overcoming these challenges and achieving successful digital transformation. Digital transformation is closely linked to the need to adopt emerging technologies to remain competitive in the Internet age, where both online and offline services are delivered to customers. The shift to online services has enhanced flexibility and automation through standardization (Puriwat & Tripopsakul, 2021).

Digital Transformation Capability

A business's digital transformation capability refers to its ability to implement new digital technologies in organization, operations, and management, while simultaneously generating valuable assets from these digital applications. This enables businesses to optimize resources, better meet market needs, and create added value (Nguyen Thi Kim Anh et al., 2022).

Organizational Performance

Organizational performance is a key driver of profit in any company, with employee performance playing a crucial role and receiving increased attention in company evaluations. As income is generated from sales, the intense competition across industries prompts employees to focus on cost efficiency. Organizational performance can be effectively managed by leveraging digital transformation technology across all production and business activities. Digital transformation has a positive impact on organizational performance, enabling companies to proactively deliver timely services to customers (Kusuma et al., 2024).

2.2 Research method

The study used a mixed research design that included qualitative and quantitative methods.

Qualitative research

The study collected domestic and foreign documents to find data related to this study, including research reports and research results published in domestic and international scientific journals. Based on the theoretical basis of digital transformation, the study systematized the concepts, components and meanings of digital transformation. At the same time, the study found out the factors affecting the ability to transform digitally and the performance of the organization.

The study explored various aspects of businesses undergoing digital transformation, incorporating expert surveys and group discussions to propose a research model and develop a scale for the model's variables. The Delphi method was used, conducting a survey with five experts: one specializing in digital transformation consulting, and two leaders and two managers from businesses that have successfully undergone digital transformation. As a result of the discussion, the research team inherited the digital transformation capability scales and adjusted the observed variables to suit the practical digital transformation capability of enterprises.

Quantitative Research

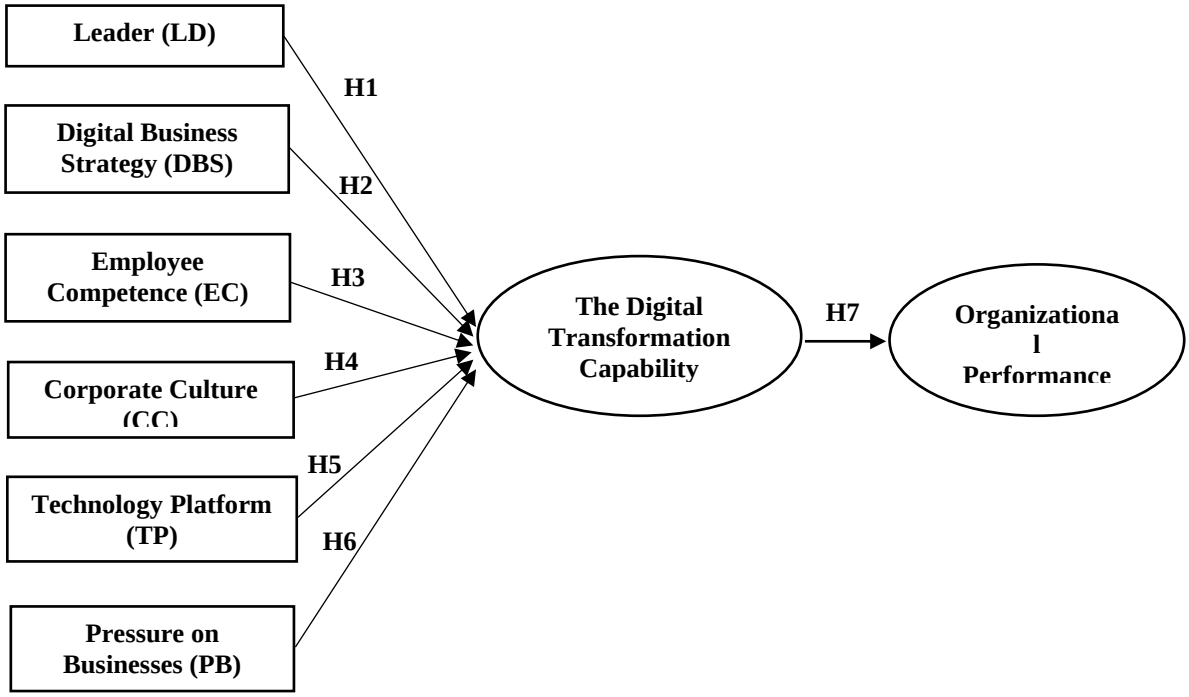
The survey was distributed to leaders, managers, and key employees of 40 enterprises in Ho Chi Minh City, spanning various industries such as manufacturing, agriculture, trade, and services, with different company sizes, to gather their opinions. Data were collected through both direct and online surveys. The study employed exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) techniques. As outlined by Hair et al. (2006), the sample size was calculated using the formula N = 5*m, where *m* represents the number of observed variables. With 42 observed variables in the conceptual scales, the required sample size was determined to be 210. To ensure more representative results, the final sample size was set at 400.

The sampling technique used was non-probability convenience sampling. Valid survey responses were collected from 359 leaders, managers, and key employees working on successful digital transformation business processes. The model

scales were assessed for reliability using Cronbach's Alpha, and the data were analyzed using EFA, CFA, and structural equation modeling (SEM). Quantitative analysis was performed using SPSS 26.0 and AMOS 24.0 software.

2.3. Research Model and Hypothesis

Research Model



(Source: Research team proposed)

Fig 1. Proposed Conceptual Model

Research Hypotheses

H1: Leadership has a positive impact on promoting digital transformation

H2: Digital business strategy has a positive impact on promoting digital transformation

H3: Employee competencies have a positive impact on promoting digital transformation

H4: Corporate culture has a positive impact on promoting digital transformation

H5: Technology platforms have a positive impact on promoting digital transformation

H6: Pressure on businesses has a positive impact on promoting digital transformation

H7: Digital transformation capabilities have a positive impact on organizational performance

III. RESULT AND DISCUSSION

3.1 Cronbach's Alpha Test

Table 1. Cronbach's Alpha coefficient of official scales

The scales	Cronbach's Alpha	Conclusion on reliability	Corrected Item-Total Correlation	Comments and reviews
LD	0.913	**Very good**	0.708 – 0.794	Strong, highly reliable
DBS	0.902	**Very good**	0.736 – 0.791	Strong, highly reliable
EC	0.892	**Very good**	0.707 – 0.791	Strong, highly reliable
CC	0.893	**Very good**	0.637 – 0.781	Strong, highly reliable
TP	0.892	**Very good**	0.713 – 0.790	Strong, highly reliable
PB	0.871	**Good**	0.593 – 0.764	Very stable, no need for variables
DTC	0.893	**Very good**	0.659 – 0.779	Strong, highly reliable

The scales	Cronbach's Alpha	Conclusion on reliability	Corrected Item-Total Correlation	Comments and reviews
OP	0.885	**Very good**	0.667 – 0.761	Strong, highly reliable

(Source: Quantitative data results)

The results of the reliability analysis showed that all scales achieved high reliability. Specifically, the Cronbach's Alpha coefficients of the scales ranged from 0.871 to 0.913, exceeding the threshold of 0.70 recommended for formal quantitative research (Hair et al., 2022). At the same time, all observed variables had adjusted item-total correlation coefficients greater than 0.60, indicating that the variables were closely correlated with each other. Therefore, all scales were eligible for exploratory factor analysis (EFA).

3.2 Exploratory Factor Analysis (EFA)

The study used principal axis analysis for extraction and Promax rotation for matrix rotation, applying these techniques to all 42 variables. The results are summarized as follows:

KMO and Bartlett's test

Table 2. KMO and Bartlett's test results

KMO value (Kaiser-Meyer-Olkin of Sampling Adequacy)		.940
Bartlett's statistic (Bartlett's Test of Sphericity)	Approx. Chi-Square	9421.877
	Df	861
	Sig.	.000

(Source: Quantitative data results)

Table 2 shows that the KMO value is 0.940, which is greater than 0.5, indicating that the EFA is well-suited to the actual data. Additionally, the significance value for Bartlett's test is 0.000, which is less than 0.05, suggesting that the observed variables are linearly related to the representative factor.

Rotated matrix of factors, eigenvalue coefficients, and extracted variance criteria

The analysis results show that all observations have factor loadings greater than 0.5 and 42 observed variables are extracted into 08 factor groups with eigenvalues of all factors > 1. The total extracted variance is 62.805%. Therefore, the 08 extracted factors reflect 62.805% of the variation in the original data.

3.3 Confirmatory Factor Analysis (CFA)

EFA extracted 08 factors, each factor corresponding to a group of scales, which were then used to develop a measurement model of the concepts. This model was analyzed by CFA to assess its suitability to the research data. The results of CFA are summarized as follows:

Model fit testing

Table 3. Indexes assessing the model's suitability to the research data

Measure	Estimate	Threshold	Interpretation
CMIN	850.833	--	--
DF	791.000	--	--
CMIN/DF	1.076	Between 1 and 3	Excellent
CFI	0.993	> 0.95	Excellent
SRMR	0.037	< 0.08	Excellent
RMSEA	0.015	< 0.06	Excellent
PClose	1.000	> 0.05	Excellent

(Source: Quantitative data results)

Table 3 shows that 1 < CMIN/DF = 1.076 < 3, and the values for CFI, SRMR, RMSEA, and PClose are all within acceptable ranges. Therefore, the model is considered to be a good fit with the market research data.

Scale reliability assessment

A scale is considered reliable if the composite reliability (CR) exceeds 0.5 and the average variance extracted (AVE) is above 0.5 (Hair et al., 2022). As shown in Table 4, all CR values are greater than 0.5, and the AVE for all scales also exceeds 0.5. Therefore, the measurement scales are deemed reliable.

Table 4. Composite reliability and total variance extracted for factors

Latent Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
LD	0.913	0.913	0.679
DBS	0.902	0.902	0.649
EC	0.892	0.893	0.625
CC	0.893	0.895	0.589
TP	0.892	0.894	0.628
PB	0.871	0.877	0.590
DTC	0.893	0.894	0.585
OP	0.885	0.886	0.610

(Source: Quantitative data results)

Convergent validity test

A scale demonstrates convergent validity when the standardized weights of the scales exceed 0.5 and are statistically significant (Hair et al., 2022). Convergent validity is also assessed using the average variance extracted (AVE), suggesting that an AVE of 0.5 or higher indicates convergent validity. Based on the results in Table 4, all coefficients exceed 0.5, and the AVE values are either above or close to 0.5. Therefore, it can be concluded that the factors exhibit convergent validity.

The correlation coefficients among the concepts indicate that the AVE for each concept exceeds the square of its correlation coefficients with other concepts. Consequently, these findings confirm that each concept or scale demonstrates discriminant validity. The correlation matrix for the concepts is presented in Table 5 below.

Table 5. Correlation matrix between concepts in the study

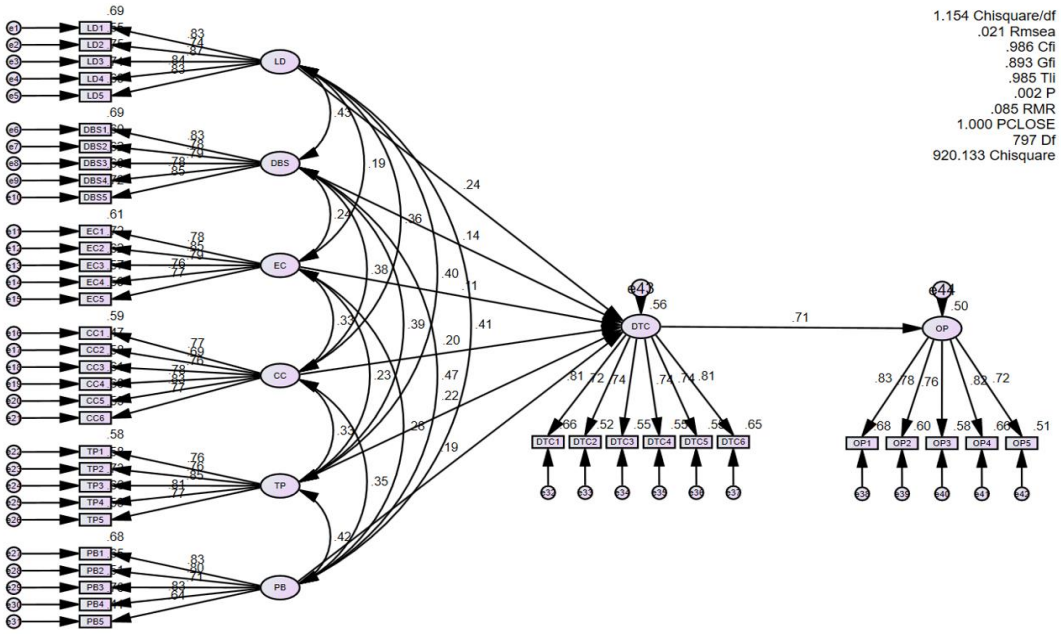
	AVE	MSV	LD	DBS	EC	CC	TP	PB	DTC	OP
LD	0.679	0.285	**0.824**							
DBS	0.649	0.279	0.426***	**0.805**						
EC	0.625	0.131	0.194**	0.243***	**0.790**					
CC	0.589	0.246	0.360***	0.385***	0.333***	**0.767**				
TP	0.628	0.306	0.397***	0.391***	0.233***	0.329***	**0.792**			
PB	0.590	0.269	0.411***	0.468***	0.276***	0.354***	0.416***	**0.768**		
DTC	0.585	0.441	0.527***	0.485***	0.342***	0.488***	0.504***	0.519***	**0.765**	
OP	0.610	0.441	0.533***	0.528***	0.361***	0.496***	0.553***	0.514***	0.664***	**0.781**

(Source: Quantitative data results)

Testing the convergent validity through the correlation matrix for the concepts in Table 5 shows that all AVE values are > MSV values. At the same time, the square root of AVE at the main diagonal in the matrix is also > the correlation coefficients between other pairs of concepts. This shows that each concept in the model has clear discriminant validity. In other words, the concepts measure different theoretical constructs and do not overlap with each other, ensuring that each scale reflects a specific aspect of organizational performance of SMEs in Ho Chi Minh City.

3.4 Structural equation analysis

After the CFA, the study used SEM to determine the relationship between the factors in the research model, presented in Figure 2 below.



(Source: Quantitative data results)

Figure 2. SEM linear structural model analysis results

Figure 2 illustrates that the model fits the research data, with 1 < CMIN/DF = 1.154 < 3. Additionally, the values for CFI, SRMR, RMSEA, and PClose are all within acceptable ranges. The results of the SEM analysis indicate that the 8 extracted factors explain 62.805% of the data variation. As a result, all hypotheses outlined in the proposed model are accepted at a 95% confidence level.

IV. CONCLUSION

The research results show that there are 07 factors affecting the organizational performance of small and medium enterprises in Ho Chi Minh City, including: (1) Leadership; (2) Digital business strategy; (3) Employee capacity; (4) Corporate culture; (5) Technology platform; (6) Pressure on enterprises; (7) Digital transformation capacity. At the same time, this result shows that digital transformation capacity plays a positive mediating role in the relationship between factors and organizational performance of small and medium enterprises in Ho Chi Minh City. From there, it shows that digital transformation is considered a core solution, a necessary turning point for small and medium enterprises to improve their capacity, strengthen their competitive advantage and develop sustainably. Nowadays, digital transformation is an inevitable trend, but not all enterprises can succeed in this transition. From the research results, the authors made the following observations:

First, companies that pioneered the application of digital technology have grown strongly, becoming "giants" with improved operating models, more satisfied customers and more effective resource management.

Second, in Vietnam, most businesses still face many challenges such as financial constraints, the risk of information leakage, disrupted supply chains and inconsistent infrastructure. These obstacles make many businesses skeptical about the potential benefits of digital transformation.

Third, each business's digital transformation journey is unique, shaped by a combination of internal and external factors according to the specific resources of each business.

Finally, digital transformation is considered a core solution and a necessary turning point for small and medium-sized enterprises to enhance their capacity, improve their competitive advantage and develop sustainably.

The study shows that SMEs in Ho Chi Minh City have clearly recognized the importance of digital transformation, but the level of implementation is still limited due to technical and resource obstacles. Currently, 70% of enterprises

choose to purchase technology in parts, while only 30% actively research and innovate technology. Therefore, the State and associations are recommended to provide a number of solutions such as capital support, technology transfer, information provision and tax reduction. To promote high efficiency in organizations and promote sustainable development of the Vietnamese economy in the digital age, enterprises must embrace digital transformation strategically and overcome the challenges they face.

Limitations and future research directions

The scope of the study is still narrow, only surveying samples from 40 SMEs in Ho Chi Minh City, so the sample size is not high, and it is not possible to compare different industries with differences in digital transformation capacity. The next research direction should expand the scope nationwide, and should study many different industries to show how the difference in digital transformation capacity between businesses has impacted organizational performance.

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DEVELOPING THE MODEL OF MEDIA FACTORS IMPACT ON FRESHMEN'S DECISION TO CHOOSE HO CHI MINH CITY UNIVERSITY OF ECONOMICS AND FINANCE

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ABSTRACT

Media in education plays an important role in connecting and interacting between stakeholders, including students, lecturers, administrators, and the community. Effective media helps convey information about the school's curriculum, policies, and activities and creates a positive learning environment, encouraging participation and cooperation between parties. With a qualitative research method, the objective of the topic is to build and test a model of media factors impact on the decision to choose Ho Chi Minh City University of Economics and Finance (UEF) freshmen's including Advertising, Marketing content, Online reviews, Influence from people around, Events, Influence from celebrities impact on Freshmen's Decision to choose UEF. Thereby, proposing management implications to improve the Freshmen's Decision to choose UEF. At the same time, enhancing effective media and career counseling helps the school attract and retain potential students.

Keywords: media, freshmen's, decision to choose Ho Chi Minh City University of Economics and Finance.

1. INTRODUCTION

Currently, many universities aim to expand and diversify their majors to attract the attention of candidates and parents. University need to pay attention to carefully studying the characteristics of this group of subjects, including differences in regions, economic conditions, and level of understanding, to develop appropriate outreach strategies. In particular, 12th-grade students and their parents are the subjects that universities need to target in their recruitment work. However, to be effective, university need to classify and approach them according to the characteristics of each group. Media work, especially media for recruitment, plays an important role in building the image and maintaining the development of the school. The design of media messages needs to be easy to understand, and close, with visual and vivid images to convey information accurately to the right audience. University also need to conduct thorough research on labor market needs and forecast the development trends of occupations in society. From there, university can develop appropriate training programs that meet actual needs and ensure that graduates can find jobs, contributing to socio-economic development. The use of diverse media tools, from traditional media such as bulletin boards and leaflets to online platforms such as social networks and emails, helps increase access to information and creates opportunities for students to express their opinions, contribute, and give feedback. By developing a clear and consistent media strategy, universities can improve their image, enhance the quality of educational services, and attract potential students, while maintaining good relationships with the community and stakeholders.

The new point of the topic is to systematize the theoretical basis of media factors influencing the decision of freshmen's to choose UEF. Thereby, a model of influencing factors is built, in which not only the factor of Freshmen's' Awareness of the School Brand is an intermediate variable, but the factors of Events and Marketing Content are also new points in the model…

1. THEORETICAL BASIS

1.1. Background Theoritical

1.1.1. Organizational Media Theory

Hargie and Tourish (2012) argue that the Organizational Media Theory of Universities is a way of explaining how universities communicate both internally and externally. In a university setting, organizational media helps connect departments, divisions, and administration and creates a link between the university and its students, faculty, staff, and

community. Internal media ensures that faculty, staff, and students are aware of the university's policies, programs, and goals; external media aims to build the university's image and brand to the public, potential students, parents, and partners…

1.1.2. Brand Media Theory

Keller (2003) argues that the Brand Media Theory in the university environment is that building and maintaining a strong brand is an important factor for competition and sustainable development. The university brand is not only limited to the logo or color but also expressed through the core values, mission, and experience that the school brings. To achieve this, university need to build their image and reputation through effective media strategies such as websites, social networks, advertising, and organizing events. The reputation of the university will directly affect the decision of potential students to choose the university. At the same time, personalizing the brand through clear messages about the mission, quality of education and student support services will help the university position itself in the public's mind.

1.1.3. Social Network Theory

Borgatti and Halgin (2011) argue that Social Networking Theory in Universities is increasingly playing an important role in university medias, where students, faculty, and staff can easily interact and share information through platforms such as Facebook, Instagram, LinkedIn, and Twitter. Through this, university can expand their influence, not only promoting their programs but also building a vibrant academic community and connecting with alumni. At the same time, social networks also facilitate two-way interaction, helping university collect feedback from students and the community to adjust strategies and improve services...

1.1.4. Integrated Marketing Communication - IMC

Duncan and Moriarty (1998) argue that Integrated Marketing Communications Theory in higher education emphasizes the use of multiple communication channels to create a consistent message that effectively impacts the target audience. In the higher education environment, integrated marketing communications (IMC) includes advertising, public relations, and event planning to promote academic programs, student support services, and research activities. To be effective, the university's message must be communicated consistently through channels such as advertising, social media, email, events, and admissions. At the same time, multi-channel coordination between traditional media such as newspapers, magazines, and digital media such as websites, email, and social media also helps increase communication reach and effectiveness.

1.2. Concept

1.2.1. Media

Media is the activity of showing the advantages of a product or service to the public, to persuade customers to buy the product or service (Kotler, 2012; Kotler & Keller, 2012). Media activities carried out by IKHAC include visiting university, hanging banners, distributing leaflets, and using social media. Research (Gusdiandika & Sinduwiatmo, 2016) shows that media activities including advertising and direct marketing influence the university choice decisions of SMK 10 November Sidoarjo students. Media can influence the decision to choose a university, the image of the university, and the quality of education (Ahn et al., 2021; Sufirmansyah et al., 2021). Media in the field of education plays an important role. According to Kango et al. (2021), media activities have a great influence on the interest of freshmen's in Madrasah Bertaraf Internasional (MBI) Pacet, Mojokerto.

1.2.2. Freshmen's

After completing high school, if students wish to continue their studies at university, they will search for information about university such as location, admission scores, majors, tuition fees, facilities, and teaching staff through many sources of information and personal connections. They will then evaluate this information based on their personal circumstances and preferences to decide which university they want to enroll in. Students are studying and researching at higher education institutions, pursuing college and university programs (according to Article 59 - Law on Higher Education, 2015). Therefore, freshmen's include students who have just graduated from high school or candidates who have passed university entrance exams nationwide.

1.2.3. University selection decision

Chapman (1981), in his study of "A Model of College Choice," proposed a model that included five factors: the university's efforts to communicate with the student, the cost, the important people in the student's life, and the student's abilities and interests. The author pointed out that both the student's family and personal factors (intrinsic factors) and the university's characteristics and media efforts (extrinsic factors) had a strong impact on the student's college choice decision. Cabrera and La Nasa (2000) emphasized three stages in the college choice process. The orientation stage is influenced by factors such as socioeconomic status, positive attitudes toward education, academic performance, and parental views. During the search stage, factors such as university information and parents' academic achievements play an important role. Finally, the decision-making stage involves the characteristics and quality of the university. Burns (2006) applied the findings from the studies of Chapman (1981) and Cabrera and La Nasa (2000) to a specific university in the United States to strengthen the connection between influencing factors and students' decisions to choose a university. Nguyen (2018) argued that a high school student's decision to choose a university is the ability or intention to decide to choose a specific university. This decision is considered as the intention to enroll in a certain university for high school students. High school student's decision to choose a university is the result of choosing an educational-training institution that meets the learners' requirements after they have considered and evaluated many different sources of information.

2. OVERVIEW RELATED RESEARCH

Nehat (2020) argues that the recent increase in the number of training programs has created a strong competition among different higher education institutions. The application of marketing activities in general and media efforts in particular has contributed to significantly enhancing the recognition of educational institutions. Organizations with strong activities in promotional campaigns often have a better position in the market, thereby helping to maintain a better media relationship with potential students who wish to enroll. This paper is based on the study of the student market, who make decisions and choose the university they will study in their chosen field. In this context, the paper presents the theoretical framework and practical elements of media activities, as well as their influence on students' decision to choose a university. Le (2020) conducted a study on the factors impact on the decision to choose a private university for first-year students majoring in Business Administration in Vietnam. The research results showed five main factors, including Reputation, Geographical location, Facilities, Attractiveness of the major, and Media. All of these factors contribute positively to enhancing the university's brand. In other words, the better the Reputation, Geographical location, Facilities, Attractiveness of the major, and Media, the more the university's brand is strengthened. In particular, media is still the top concern of freshmen's when choosing a university, so universities must take advantage of this factor to increase attractiveness. Do (2021) identified and measured the main factors influencing the decision to choose a university for high school candidates. The research model includes independent variables belonging to three main groups of factors: (1) student factors, including views on higher education, university choice, and career choice; (2) environmental factors, such as advice from others; (3) university factors, including tuition fees, study programs, employment opportunities after graduation, university reputation, extracurricular activities, facilities, and alumni network. The results show that students' preferences for university facilities, environment and reputation, reference groups, tuition fees, and university-related activities have a direct impact on the intention to choose the university they are admitted to, family influence, and influence outside the family.

Nguyen (2021) believes that the choice of major and university of high school students is a very important decision. This study focuses on identifying and measuring the level of influence of several factors impact on the university selection decision of high school students in Quang Ngai. The quantitative analysis results show that there are 5 main factors impact on students' university selection decision, in order from high to low: (1) University reputation, (2) Media activities, (3) Learning conditions, (4) Student personal factors, and (5) Influential individuals. The above results show that universities need to increase media activities to improve the university selection decision of freshmen's, attracting more candidates to register and enroll. At the same time, it is necessary to promote the use of other media tools such as social networks (Facebook, Zalo, YouTube, Twitter, Flickr, Google Plus, etc.).

Bohara et al. (2022) argued that increasing competition in higher education institutions has made brand awareness

an integral part of marketing activities to increase student enrollment. The results showed that there is a relationship between brand awareness and student decision-making process. The elements of brand awareness were identified and showed a significant impact on student enrollment decision-making process, even when adjusted for student gender. The study contributes to the understanding of the role of brand awareness in each stage of the student enrollment decision-making process for higher education institutions.

Giang et al. (2024) conducted a study to systematize the theoretical basis and identify factors influencing freshmen's' decisions when choosing UEF in the "new normal" period. The research results showed that the proposed model includes factors such as Geographical location, Media, Support, Tuition, Facilities, Brand, Personal characteristics, and Trust, all of which directly or indirectly influence freshmen's' decisions when choosing UEF in this period. The study provides valuable insights for private universities in Vietnam, especially UEF. This study can be a useful guide for private university managers in developing their enrollment strategies.

2.1. Proposed research model and hypotheses

2.1.1. Research model

Inheriting the studies of Chapman (1981), Cabrera and La Nasa (2000), Burns (2006), Nehat (2020), Le (2020), Do (2021), Nguyen (2021), Bohara et al. (2022), Giang et al. (2024) and some other studies, ... the group of authors built a model of Media factors impact on freshmen's decision to choose UEF including: Advertising, Marketing content, Online reviews, Influence from Surroundings, Events, Influence from Celebrities impact on the decision to choose a university of freshmen's through the intermediary factor of Freshmen's Perception of University brand. In which, the factors Events and Marketing Content are new points in the model.

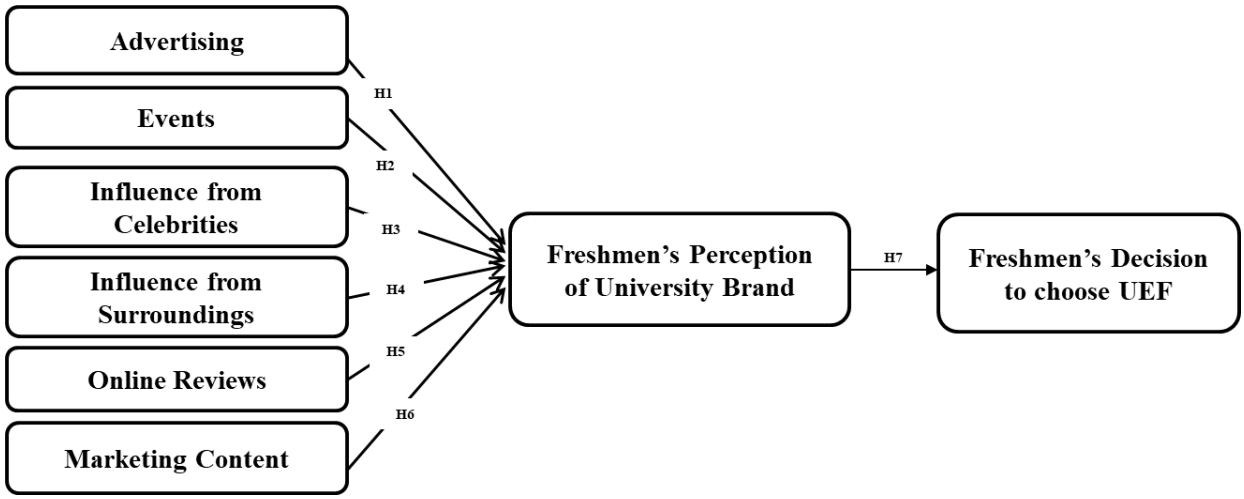


Figure 1: Model of Media factors impact on freshmen's decision to choose Ho Chi Minh City University of Economics and Finance (UEF)

2.1.2. Research hypothesis

H1: Advertising has a positive impact on Freshmen's perceptions of University Brand.

H2: Events have a positive impact on Freshmen's perceptions of University Brand.

H3: Influence from Celebrities has a positive impact on Freshmen's perceptions of University Brand.

H4: Influence from Surroundings has a positive impact on Freshmen's perceptions of University Brand.

H5: Online reviews have a positive impact on Freshmen's perceptions of University Brand.

H6: Marketing content has a positive impact on Freshmen's perceptions of University Brand.

H7: Freshmen's perceptions of University Brand have a positive impact on Freshmen's Decision to choose UEF.

3. RESEARCH METHOD

The qualitative research method is based on theoretical foundations and previous research models at home and abroad to build a research model and expected scales. Then, the focus group discussion method is implemented to adjust and supplement the observed variables used to measure the concepts in the research model. The results of the qualitative

research are the scales that have been adjusted appropriately and the official survey is used for quantitative research. The questionnaire is designed on a Likert scale from 1 to 5 to evaluate the Media factors impact on the Decision of freshmen's to choose UEF.

4. RESEARCH RESULTS

To refine the research model in accordance with the actual context of Ho Chi Minh City University of Economics and Finance, the research team conducted a qualitative study using the Focus Group Discussion method. The discussion session was held on December 26, 2024, at the university's meeting room with the participation of 13 respondents, including 10 first-year students from various majors such as Business Administration, Marketing, Finance – Banking, and Multimedia Communications, along with 3 admissions counselors working at UEF's Admissions Office, with experience in interacting and engaging with high school students. The participating students had completed their university admission process and were able to share their personal experiences regarding the factors influencing their decision to choose UEF. The discussion lasted approximately 90 minutes and was conducted using semi-structured questions, focusing on respondents' perceptions, experiences, and evaluations of the university's communication channels and promotional activities. The collected data was documented and analyzed using thematic coding.

The analysis results confirmed the initial research model, consisting of six main media-related factors influencing freshmen's university choice, including: Advertising, Marketing content, Online reviews, Influence from people around, Events, and Influence from celebrities. However, based on the actual feedback from respondents, several additional observed variables were incorporated into the model to better reflect students' real-life experiences and align with UEF's communication practices. Specifically, within the "Influence from People Around" group, in addition to existing variables such as influence from friends and parents, the discussion revealed that high school teachers or admissions advisors also played a significant role in guiding students toward UEF. As a result, the observed variable "Teachers or high school admissions advisors introduced me to UEF" was added to the questionnaire. Furthermore, in the "University Events" group, students emphasized the importance of activities such as Open Day, admissions consultation programs, and experiential workshops. Accordingly, the observed variable "Hands-on experience at UEF events helped me better understand the learning environment" was included to more accurately capture the impact of direct communication activities organized by the university.

The outcomes of this qualitative phase served as an essential foundation for developing the research model, constructing the official questionnaire, and conducting the quantitative phase to test the model and measure the impact of each media-related factor on the decision-making process of freshmen when choosing UEF.

5. CONCLUSION

The results of study have provided an initial research model identifying media factors that influence first-year students' decisions to choose UEF, while also refining and expanding the observed variables to better reflect the university's practical context. This model serves as an important foundation for conducting quantitative surveys to test the level of impact and relationships among the factors. As a result, the study will offer a more comprehensive and objective understanding of the role of media channels in shaping freshmen's perceptions and their decision-making process. Moreover, these findings form a basis for the university to develop more effective communication and enrollment policies in the future, contributing not only to raising awareness and the university's image in students' eyes but also playing a crucial role in influencing their choice of university. In particular, the media factors affecting freshmen's decision to choose UEF simultaneously create a solid foundation for the development of the university's brand in a highly competitive educational environment.

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INVESTIGATING FACTORS INFLUENCING THIRD-YEAR UEF STUDENTS' MAJOR SELECTION IN THE DIGITAL TRANSFORMATION ERA: MANAGERIAL IMPLICATIONS LEVERAGING BIG DATA

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ABSTRACT

This study explores the determinants shaping third-year students' decisions regarding major selection at the Ho Chi Minh City University of Economics and Finance (UEF) amid the digital transformation era. Against the backdrop of Industry 4.0 and accelerated by the COVID-19 pandemic, the research identifies critical factors that influence academic decisions. By integrating traditional influences - such as personal characteristics, ddmission activities, media and financial capability - with emerging digital factors harnessed through Big Data analytics, this study addresses a notable gap in current literature. The primary objective is to evaluate the impact of various elements on major selection decisions, thereby informing strategic interventions in educational management. Employing a quantitative methodology, data were gathered via an online survey from a stratified random sample of 400 third-year students using a 5-point Likert scale. Descriptive statistics, reliability tests, exploratory factor analysis, and multiple regression models were applied to identify underlying relationships among variables. Findings highlight significant associations between major selection and factors including personal characteristics and financial capacity, while revealing that admission activities and media communications exert a negative influence. The study concludes that tailored admission strategies, enhanced financial support mechanisms, and refined media practices are essential for optimizing educational outcomes in the era of digital transformation.

Keywords: Big Data; Digital Transformation; Educational Management; Major Selection; UEF.

1. INTRODUCTION

In today's rapidly advancing digital age, the intersection of education and technology is undergoing profound transformation under the twin forces of Industry 4.0 and global digitalization. The COVID-19 pandemic has not only disrupted traditional learning modalities but has also acted as a catalyst for online education adoption worldwide. According to UNESCO (2021), over 1.6 billion learners—more than 90 percent of the world's student population—engaged in remote learning during 2020. In Vietnam, a Ministry of Education and Training report (MOET, 2022) indicates that by mid-2021, 85 percent of higher education institutions had implemented blended or fully online course offerings. Globally, the e-learning market is projected to exceed USD 325 billion by 2025, growing at a compound annual rate of 7.5 percent since 2019 (Global Market Insights, 2022). A compelling statistic highlights this shift: the COVID-19 pandemic has accelerated the adoption of online education, with universities worldwide embracing digital tools to enhance educational delivery and management (Nguyễn Văn Thuận, 2023). This transition is not merely a response to immediate challenges but a strategic move towards long-term educational innovation (Lê Ba Phong & Nguyễn Đàm Minh Thông, 2022), as seen in the strategic initiatives of the Ho Chi Minh City University of Economics and Finance (UEF) to digitize student data for improved academic management.

As universities navigate this digital landscape, the decision-making process of students, particularly in choosing their academic majors, becomes increasingly complex and multifaceted. Previous research has predominantly focused on traditional determinants such as personal abilities, family influence, and job prospects (Hoàng Thị Xuân, 2023). For instance, a QS (2022) study found that 68 percent of prospective undergraduates rate the availability of online learning platforms, digital career services, and virtual internships as critical factors in their major choice. However, there is a critical research gap in understanding how digital transformation influences these decisions, particularly through the lens of Big Data analytics, which offers unprecedented insights into student preferences and trends (Huỳnh Lê Uyên Minh, 2022).

This study aims to fill this gap by investigating the factors influencing third-year UEF students' major selection in

the digital transformation era. The research seeks to identify and evaluate these factors' impacts, assess the role of Big Data in data collection and analysis, and propose actionable recommendations to enhance educational management at UEF. By leveraging Big Data, this research will offer a comprehensive analysis that not only informs academic advising but also aligns educational offerings with labor market demands.

The findings of this research are expected to make significant contributions to both academic literature and practical applications. By understanding the digital factors influencing major selection, UEF can develop targeted strategies to improve student counseling and optimize educational resources. This study also serves as a model for other institutions looking to integrate digital technologies into their educational practices, ultimately enhancing student outcomes in a rapidly changing digital landscape.

The paper explores factors influencing major selection among UEF students in the digital era, starting with a literature review, followed by a detailed methodology, findings, discussion, and recommendations for future research. It contributes to the conversation on technology's role in education and highlights its comprehensive approach.

2. LITERATURE REVIEW

2.1. Theoretical basis

The digital transformation era, characterized by rapid technological advancements and the integration of Big Data analytics, presents a unique context for investigating factors influencing third-year UEF students' major selection. This section delves into the theoretical underpinnings essential for comprehending the intricate decision-making processes that students undergo in this transformative period.

At the core of this research is the concept of major selection, a pivotal decision in a student's academic journey, with long-lasting implications on educational outcomes and career trajectories (Porter & Umbach, 2006). This decision-making process involves a complex interplay of personal interests, abilities, and external influences, requiring students to evaluate and choose the most suitable academic path (Đặng Thu Hà & Đặng Thảo Hiền, 2019).

Another critical concept is Big Data, a term encompassing the handling of vast and intricate data sets that traditional processing applications cannot manage. Big Data involves challenges related to data analysis, collection, monitoring, sharing, storage, and privacy (Zolotov et al., 2019). In the educational sphere, Big Data analytics plays a transformative role, enabling institutions like UEF to enhance decision-making processes and tailor educational offerings to better meet student needs.

This study draws upon several theoretical frameworks, providing insights into students' decision-making processes. The Theory of Reasoned Action (TRA), developed by Fishbein and Ajzen, posits that individual behavior is influenced by behavioral intentions shaped by attitudes and subjective norms (Ajzen & Fishbein, 1975). This theory underscores the rational and motivational aspects guiding human decision-making.

Building on TRA, the Theory of Planned Behavior (TPB) introduces perceived behavioral control as a pivotal factor, emphasizing individuals' beliefs about their capacity to perform certain behaviors (Ajzen, 1991). TPB offers a comprehensive framework for understanding how attitudes, social influences, and perceived control collectively determine behavioral intentions, thus influencing students' major selection decisions.

Holland's Theory of Career Choice further enriches this study by categorizing individuals into six personality types and corresponding work environments (Huỳnh Lê Uyên Minh, 2022). This theory provides a lens through which students' career-related decisions can be analyzed, considering the alignment between personality traits and potential academic and career paths.

The existing literature reveals a notable gap in understanding how digital transformation and Big Data analytics shape students' major selection decisions. This deficiency is significant, as the evolving educational landscape necessitates a deeper understanding of these influences to optimize institutional strategies and student outcomes.

The theoretical frameworks and identified research gaps serve as the foundation for this study, guiding the exploration of factors influencing UEF students' major selection in the digital transformation era. By elucidating these aspects, the research aims to provide actionable insights that enhance educational management and align academic programs with evolving labor market demands..

2.2. Literature review

The selection of an academic major by university students is a multifaceted decision influenced by a confluence of personal, institutional, and external factors. This section synthesizes prior research relevant to the determinants of major selection, particularly in the context of digital transformation and the utilization of Big Data analytics.

(Nguyễn Thị Bích Ngọc, 2022) conducted a study focusing on the factors affecting students' decisions to choose an economics major at Hoa Lư University. This research identified ten key influences, including career opportunities, academic prospects, personal characteristics, recruitment efforts, university reputation, major-specific attributes, admission potential, media influence, general evaluations, and personal influencers. The study collected data from first to third-year students across accounting and business management disciplines, revealing that these factors significantly impact students' major decisions, thus contributing to educational and socio-economic development.

In a separate investigation, (Bùi Văn Trịnh & Âu Nguyễn Thảo Nguyên, 2021) explored the determinants influencing graduate students' choice of Tây Đô University for pharmacology and clinical pharmacy programs. The study identified five critical factors: faculty competence, tuition policies, reference groups, personal characteristics, and media influence. The research, based on a survey of 165 graduate students, underscored the substantial effect of these elements on institutional choice, providing managerial insights to enhance educational quality and attract future students.

Further, (Nguyễn Cương & Lê Minh Ngọc, 2024) applied the Theory of Reasoned Action (TRA) to examine factors influencing students' intentions to pursue a logistics bachelor's program in Hanoi. Their findings highlighted the significant roles of attitudes and subjective norms in shaping these intentions, suggesting strategies to motivate and attract students to logistics programs.

(Lê Thái Phượng, 2021) investigated the decision-making process of students in Central Vietnam when selecting tourism majors. This research identified personal fit, career prospects, university reputation, reference groups, and program appeal as pivotal factors, with the perception of the tourism sector post-COVID-19 serving as a moderating variable. The study, which surveyed 600 students, provided career guidance, communication, and training implications for the tourism industry.

(Shook, 2019) examined the factors influencing information systems major selection among students in the Southeastern United States. The study emphasized personal interest, student competence, the perceived value and utility of the major, and external influences as key determinants. The research, involving 200 students, identified personal interest as the most significant factor, with a noted reliance on internet resources over familial advice.

Douglas Newson (2023) explored the applicability of the Theory of Planned Behavior (TPB) in accounting major selection among business students at historically black colleges and universities. Utilizing logistic regression and t-tests, the study found that TPB constructs - attitude, subjective norms, and perceived behavioral control - did not significantly influence major selection, highlighting underrepresentation issues in accounting programs.

These studies collectively underscore the complex interplay of personal, social, and institutional factors in academic major selection. They provide a foundational understanding that can be expanded by integrating digital transformation and Big Data analytics to inform educational management practices and align academic offerings with labor market demands.

2.3. Proposed hypotheses and research model

Research on students' major selection decisions highlights various influencing factors. (Lê Thái Phượng, 2021) identified job opportunities, personal suitability, and school reputation as primary influences. Similarly, (Nguyễn Thị Bích Ngọc, 2022) focused on communication factors, admissions, and major characteristics for economics students. In another study, (Bùi Văn Trịnh & Âu Nguyễn Thảo Nguyên, 2021) highlighted the impact of lecturers' competence and tuition policy on graduate students' choices. These studies collectively provide empirical evidence illustrating how elements like job opportunities, financial capacity, and training quality affect major selection decisions. This study builds on these findings and seeks to explore further unexplored aspects, particularly within the context of UEF.

In this study, the dependent variable is the individual decision of third-year UEF students to select the Business Administration major. This latent construct - Major Selection (MS) - is operationalized via a five-item scale (MS1–MS5)

that captures students' intention strength, perceived fit, and commitment to their chosen field (Lại Thị Thu Thủy & Nguyễn Thị Hồng Lam, 2024).

Drawing on prior empirical work and established theory (TRA, TPB, Holland's typology), we posit seven antecedent constructs:

H1: Job Opportunities positively influence major selection.

Rationale: Robust labor-market demand and clear career pathways increase students' attitude toward a field (Lê Thái Phượng, 2021; Nguyễn Thị Bích Ngọc, 2022).

H2: Financial Capability positively affects major selection.

Rationale: Perceived ability to afford tuition, living expenses, and scholarships reduces perceived barriers, enhancing commitment (Lại Thị Thu Thủy & Nguyễn Thị Hồng Lam, 2024).

H3: Personal Characteristics positively affect major selection.

Rationale: Domain-relevant skills—language proficiency, quantitative-analytical ability, and social-communication competence—shape self-efficacy and perceived behavioral control (Ajzen, 1991; Lại Thị Thu Thủy & Nguyễn Thị Hồng Lam, 2024; Nguyễn Thị Bích Ngọc, 2022).

H4: Family and Societal influences positively impact major selection.

Rationale: Supportive norms—from parents, peers, teachers—and positive societal perceptions foster subjective norms that guide intentions (Ajzen & Fishbein, 1975; Lại Thị Thu Thủy & Nguyễn Thị Hồng Lam, 2024).

H5: Media influence positively shapes major selection.

Rationale: Exposure to reliable digital content—promotional videos, social-media campaigns—affects students' attitudes and perceived information sufficiency (Nguyễn Thị Bích Ngọc, 2022).

H6: Admission Activities positively affect major selection.

Rationale: Transparent, personalized consultancy—delivered through digital channels—enhances informational clarity and students' perceived behavioral control (Nguyễn Thị Bích Ngọc, 2022).

H7: Quality of Education positively associates with major selection.

Rationale: Rigorous curricula, faculty competence, modern facilities, and real-world experience opportunities strengthen students' perceived value of the program (Lê Thái Phượng, 2021).

Big Data underpins and amplifies each antecedent by enabling real-time, personalized insights into student preferences and labor market dynamics (Zolotov et al., 2019; Huỳnh Lê Uyên Minh, 2022). Specifically:

– Job Opportunities: Advanced analytics forecast emerging industry demands, allowing institutions to present up-to-date employment statistics and career path simulations.

– Financial Capability: Predictive models identify students' scholarship eligibility and simulate financial-aid scenarios.

– Personal Characteristics: Learning analytics profile students' skill sets (e.g., language, quantitative reasoning, social engagement) and recommend major fit.

– Family and Societal Influences: Social network analysis maps peer and alumni endorsements, amplifying positive normative pressures.

– Media: Data-driven content personalization tailors promotional materials to individual interests, enhancing message relevance and credibility.

– Admission Activities: Dashboards track prospective students' engagement, enabling timely follow-up and customized guidance.

– Quality of Education: Continuous feedback loops from course evaluations and digital platforms inform program enhancements that are communicated back to prospective cohorts.

In our model (Figure 2.1), Big Data is not an additional standalone variable but a pervasive mechanism that reinforces the validity, timeliness, and personalization of all seven antecedent constructs. Through this integration, the research

captures how digital transformation—driven by Big Data analytics—shapes major selection decisions in a nuanced and measurable way.

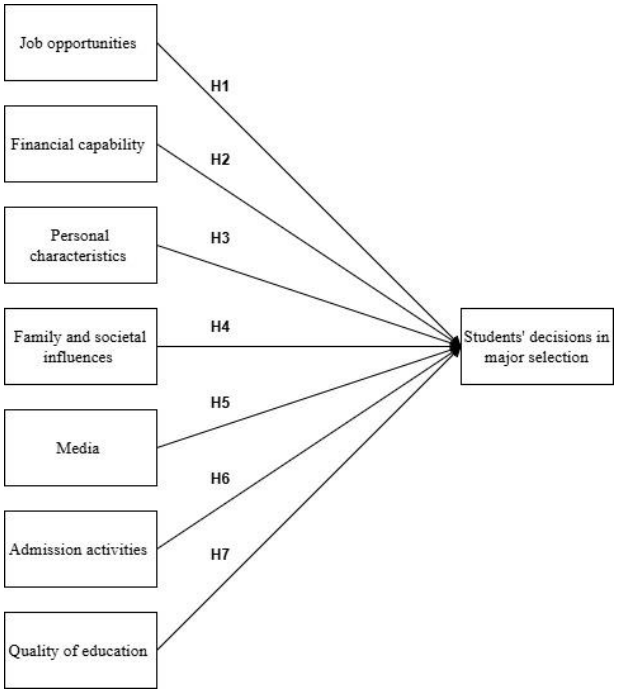


Figure 2.1. Proposed research model

(Source: Author)

3. METHODOLOGY AND DATA

3.1. Data

The focus of this research is on third-year students majoring in Business Administration at UEF, within the age range of 19-25. These students are navigating their academic major selections amidst the ongoing digital transformation era. The study aims to understand the complex factors influencing their decisions, emphasizing the integration of digital tools and Big Data analytics.

To achieve a representative understanding, a sample size of 400 students was determined using Cochran's formula, accounting for a 95% confidence level ($Z = 1.96$), with an estimated proportion of $p = 0.5$ and a margin of error of $e = 0.062$, the minimum required sample size is 250 students. The study utilizes 400 observations, this sample size ensures an accurate reflection of the diverse student body and their varied experiences in major selection processes.

A simple random sampling method was employed to minimize bias and ensure each student had an equal chance of being selected. This approach is particularly effective in maintaining the objectivity and reliability of the data collected. Although simple random sampling provides a straightforward mechanism to capture a broad spectrum of student perspectives, it may limit the depth of insights into specific subgroups unless further stratifications are applied.

Data were gathered through an online survey deployed via Google Forms, which facilitated the efficient distribution and collection of responses. The survey was designed to capture primary data directly from the target demographic, using a 5-point Likert scale to evaluate factors such as employment opportunities, financial capacity, personal characteristics, media influence, and educational quality. This method was chosen for its capacity to reach a large number of participants rapidly and its ability to streamline data aggregation for subsequent analysis. Additionally, Google Forms supports anonymity, encouraging honest and uninhibited responses from participants.

3.2. Data analysis method

Descriptive statistics, including measures of central tendency and dispersion (mean, variance, and standard deviation), were utilized to summarize the sample characteristics and response patterns. This initial analysis provided a foundational understanding of the data distribution and identified any anomalies requiring further investigation.

The reliability of the survey instruments was assessed using Cronbach's Alpha, with a threshold of $\alpha \geq 0.7$ indicating

acceptable internal consistency. This analysis ensured that the constructs measured were reliable and could be consistently interpreted across different respondents.

EFA was conducted to uncover the underlying factor structure of the observed variables. The Kaiser-Meyer-Olkin (KMO) measure was used to verify sampling adequacy, and Bartlett's test of sphericity confirmed the data's suitability for factor analysis. Factors with loadings exceeding 0.5 were retained for further analysis, ensuring the constructs' validity.

Multiple linear regression was performed to explore the relationships between independent variables (e.g., personal abilities, job prospects, family influence) and the dependent variable (major selection decision). The adjusted R-squared value evaluated model fit, while the Durbin-Watson statistic checked for autocorrelation. Multicollinearity was assessed using the Variance Inflation Factor (VIF), and the significance of predictors was evaluated through p-values.

Data integrity was ensured through rigorous data cleaning procedures, including the removal of incomplete responses and outliers. Ethical considerations were paramount, with informed consent obtained from all participants and assurances of confidentiality and privacy maintained throughout the study.

Potential limitations of the study include sampling bias inherent in the stratification process and the limited generalizability of findings beyond UEF's specific context. Future research could expand the scope to encompass a wider range of educational institutions and geographic regions, enhancing the generalizability of the results.

All statistical analyses were conducted using SPSS 25.0, a robust tool that provided precise and reliable results conducive to the study's analytical needs.

4. RESEARCH RESULTS AND DISCUSSION

4.1. Descriptive statistics

This study aims to explore the factors impacting the major selection of third-year students at the UEF in the context of digital transformation. Data was collected via a comprehensive survey administered through Google Forms, yielding 432 initial responses. After excluding 32 non-compliant entries, the final sample comprised 400 randomly selected third-year students, ensuring a robust dataset for subsequent analysis.

The demographic details of the respondents, as illustrated in Table 4.1, reveal a slight gender imbalance, with females representing 55% and males 45% of the participants. This distribution suggests potential gender-based differences in major selection preferences among UEF students. Age-wise, the data indicates a predominant age range of 20-22 years, accounting for 98.3% of the sample. This aligns with the typical age range for third-year university students in Vietnam. Notably, only a small fraction of students were either younger or older than this range, highlighting a fairly homogeneous age distribution within the sample.

Family income statistics show a nearly equal division between households earning 10-20 million VND (38.5%) and those earning above 20 million VND (39%). A smaller segment, 22.5%, comes from families earning less than 10 million VND. This suggests that the financial background of students' families is diverse and could potentially influence their educational choices.

Table 4.1. Descriptive statistics

Characteristics		Frequency	Percent (%)
Gender	Male	180	45.0
	Female	220	55.0
Age	Under 20 years old	6	1.4
	20 – 22 years old	393	98.3
	Older than 22 years old	1	.3
Income	Less than 10 million VND	90	22.5
	10 – 20 million VND"	154	38.5
	More than 20 million VND"	156	39.0
Family employment relevance to field of study	Yes	329	82.3
	No	71	17.2

(Source: Author)

Table 4.2. Reliability of the measurement scales

Variable	Code	Statement	Source	Corrected Item – Total Corelation	Cronbach's Alpha if Item Deleted
Job opportunities (α = .822, n = 7)	**JO1**	I believe this major offers stable income.	(Lê Thái Phượng, 2021; Nguyễn Thị Bích Ngọc, 2022)	.561	.800
	JO2	I have long-term career advancement opportunities in this field.		.633	.784
	JO3	I can easily find a job after graduation.		.590	.794
	JO4	Studying this major gives me the opportunity to work in a dynamic environment.		.550	.802
	JO5	I think this major is in high demand in the labor market.		.649	.781
	JO6	The high rate of graduates working in the field makes me want to choose this major.		.551	.802
	JO7	The faculty and university support my job search by connecting with reputable companies.		.256	.822
Financial capability (α = .781, n = 4)	**FC1**	The tuition of this major is reasonable for what I receive.	(Lại Thị Thu Thủy & Nguyễn Thị Hồng Lam, 2024)	.609	.716
	FC2	My family can afford the tuition fees.		.584	.729
	FC3	I can afford living expenses throughout my studies.		.601	.720
	FC4	This major offers many scholarships to support students.		.550	.746
Personal characteristics (α = .831, n = 6)	**PC1**	This major aligns with my personal interests.	(Lại Thị Thu Thủy & Nguyễn Thị Hồng Lam, 2024; Nguyễn Thị Bích Ngọc, 2022)	.576	.809
	PC2	I chose this major because it suits my personality.		.552	.814
	PC3	My academic ability is suitable for excelling in this major.		.639	.796
	PC4	This major meets the skills I want to develop.		.607	.803
	PC5	I have many opportunities to express myself when choosing this major.		.636	.797
	PC6	The major aligns with my long-term goals.		.605	.803
Family and societal influences (α = .793, n = 4)	**FSI1**	My family supports my choice of this major.	(Lại Thị Thu Thủy & Nguyễn Thị Hồng Lam, 2024)	.630	.728
	FSI2	I am supported by friends and teachers to pursue this major.		.532	.777
	FSI3	Successful individuals from this major motivate me to choose it.		.624	.731
	FSI4	Society has a positive view of the major I've chosen.		.627	.730
Media (α = .738, n = 4)	**ME1**	I am attracted by promotional videos and images about the major.	(Nguyễn Thị Bích Ngọc,	.590	.644
	ME2	I found information about the major through		.506	.692

		the Internet, social networks, etc.	2022)		
	ME3	The promotional campaigns for this major help me better understand learning and career opportunities.		.542	.671
	ME4	The media information is reliable and useful to me.		.484	.705
Admission activities (α = .950, n = 4)	**AA1**	I received enthusiastic support from the admission consulting team when learning about the major.	(Nguyễn Thị Bích Ngọc, 2022)	.880	.933
	AA2	The school's admission consulting activities through mass media, the Internet, etc., attracted me to choose the major.		.885	.932
	AA3	The admission consultancy information is clear and helps me determine a suitable major.		.875	.935
	AA4	I find the admission activities transparent and accessible.		.871	.936
Quality of education (α = .786, n = 6)	**QE1**	The training program of the major is appealing to me.	(Lê Thái Phượng, 2021)	.535	.755
	QE2	I chose this major because the quality of teaching by lecturers is excellent.		.579	.740
	QE3	The faculty and university facilitate many extracurricular activities related to the major that attract me.		.564	.745
	QE4	The school's facilities meet all the criteria for the major I choose.		.592	.736
	QE5	I am provided with comprehensive high-quality learning materials.		.541	.753
	QE6	This major provides many opportunities for practical and real-world experience.		.047	.786
Major selection (α = .798, n = 5)	**MS1**	I chose this major for the high job opportunities.	(Lại Thị Thu Thủy & Nguyễn Thị Hồng Lam, 2024)	.543	.771
	MS2	I chose this major because the tuition is reasonable.		.609	.750
	MS3	I chose this major because it fits my personal interests.		.572	.762
	MS4	I trust the information I know about the major.		.605	.752
	MS5	I am satisfied with what I receive when participating in the admission program.		.568	.763

(Source: Author)

Furthermore, the data reveals that 82.3% of students chose majors related to their family's occupation, underscoring the influence of familial career paths on academic decisions.

Descriptive statistical analysis was conducted to examine the main variables influencing major selection. The data, analyzed using SPSS, highlights the significance of personal abilities, family influence, and job prospects as traditional determinants. However, in the digital transformation era, additional factors, such as exposure to digital tools and familiarity with technology, also play a crucial role. The incorporation of Big Data analytics offers deeper insights into these preferences, providing a nuanced understanding of how digital competencies shape educational trajectories.

The gender disparity observed suggests that female students might prioritize different factors compared to their male

counterparts. Similarly, the income distribution highlights potential disparities in access to resources and opportunities, which could affect major selection. The significant role of family employment in shaping educational paths further emphasizes the cultural context and social expectations impacting students' decisions.

The study suggests that UEF can improve student satisfaction and success by leveraging Big Data analytics to optimize academic advising services. By recognizing diverse factors influencing major selection, UEF can better align its offerings with labor market demands and technological advancements.

4.2. Reliability Analysis

The reliability assessment of the measurement scales utilized in this study was conducted using Cronbach's Alpha and corrected item-total correlation coefficients. This analysis is crucial in ensuring the internal consistency of the constructs measured, thereby validating the data collection tools employed in this research.

The reliability of each construct was evaluated against the threshold of Cronbach's Alpha > 0.7, which indicates acceptable reliability, while corrected item-total correlation values greater than 0.3 were required for individual items to be retained within their respective scales (Trong & Ngoc, 2008).

Initially comprising seven items, the job opportunities (JO) scale demonstrated a Cronbach's Alpha of 0.801. However, item JO7 exhibited a corrected item-total correlation of 0.256, falling below the acceptable threshold. Consequently, this item was excluded, resulting in an improved Cronbach's Alpha of 0.822, thus confirming the reliability of the remaining six items. This research also used Cronbach's Alpha to assess the reliability of constructs such as Financial Capability (FC), Personal Characteristics (PC), Family and Societal Influences (FSI), Media (ME), and Admission Activities (AA). Each construct had a Cronbach's Alpha of 0.781, 0.793, 0.738, and 0.795, indicating satisfactory reliability and robust internal consistency, ensuring valid and consistent inclusion in future studies.

The reliability analysis confirms that the majority of the measurement scales employed in this study exhibit strong internal consistency, meeting the requisite thresholds for Cronbach's Alpha and corrected item-total correlations. These results provide a sound basis for proceeding with further statistical analyses, ensuring that the constructs measured accurately reflect the factors influencing major selection among third-year UEF students in the context of digital transformation.

4.3. Exploratory Factor Analysis

The exploratory factor analysis (EFA) presented in this research investigates the determinants impacting third-year UEF students' selection of academic majors amidst the digital transformation era. The suitability of the dataset for factor analysis was corroborated by the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, which achieved a robust score of 0.902, indicative of an excellent sample adequacy. Additionally, Bartlett's Test of Sphericity yielded a significant chi-square value of 5707.625 (p=0.000), affirming the correlations among the variables were sufficiently large for EFA.

Table 4.3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.902
Barlett's test of Sphericity	**Approx. Chi Square**	5707.625
	df	528
	Sig.	0.000

(Source: Author)

In the analysis, components with eigenvalues exceeding 1 were retained, resulting in the identification of seven distinct components, cumulatively accounting for 60.855% of the total variance. The first component, which explains the largest portion of variance (26.103%), encompasses variables related to personal characteristics, with factor loadings strong above 0.77. The second component, explaining 7.912% of the variance, focuses on job opportunity perceptions, with significant loadings exceeding 0.76. The third component, capturing 7.314% of the variance, highlights quality education factors, all demonstrating loadings above 0.74. Subsequent components delineate additional influencing factors: the fourth component pertains to admission activities with loadings above 0.74, while the fifth addresses familial and social influences, showcasing loadings over 0.78. The sixth component, emphasizing financial considerations, also

exhibits robust factor loadings above 0.76. Lastly, the seventh component, relating to media experiences, presents loadings surpassing 0.78.

The cumulative variance explained by these components underscores their representational adequacy regarding the data's underlying structure. This well-defined factor solution satisfies the conditions for convergent validity, with all factor loadings exceeding the threshold of 0.5, and also ensures discriminant validity by demonstrating distinct separation across components. Consequently, the EFA findings offer a comprehensive framework for understanding the multifaceted factors influencing major selection among UEF students, providing valuable insights for educational management and policy formulation in the digital transformation context.

Table 4.5. Summary table of Factor Loadings after rotation

Factor	Variable
Job opportunities (JO)	JO1, JO2, JO3, JO4, JO5, JO6
Financial capability (FC)	FC1, FC2, FC3, FC4
Personal characteristics (PC)	PC1, PC2, PC3, PC4, PC5, PC6
Family and societal influences (FSI)	FSI1, FSI2, FSI3, FSI4
Media (ME)	ME1, ME2, ME3, ME4
Admission activities (AA)	AA1, AA2, AA3, AA4
Quality of education (QE)	QE1, QE2, QE3, QE4, QE5

(Source: Author)

4.4. Research Model Fit Assessment

4.4.1. Correlation Analysis

An analysis of third-year UEF students' major selection decisions in the context of digital transformation reveals significant correlations between various factors and their choices. Utilizing Pearson's correlation coefficient, this study identifies positive correlations between Major Selection (MS) and several independent variables: Personal Characteristics (PC) with a coefficient of 0.307, Job Opportunities (JO) at 0.366, Financial Capability (FC) at 0.327, and Family and Societal Influences (FSI) at 0.281, all significant at $p < 0.01$. These findings suggest that personal traits, job prospects, financial resources, and external influences notably impact students' academic decisions, highlighting pragmatic and economic considerations. Conversely, Media (ME) and Admission Activities (AA) show negative correlations with coefficients of -0.353 and -0.466, respectively, indicating that these factors might introduce uncertainties or pressures that adversely affect major selection. Quality of Education (QE) has a weaker negative correlation of -0.128 ($p < 0.05$), suggesting it is not a primary determinant in decision-making. Correlation analysis underscores the complexity of academic decision-making, integrating personal, economic, and societal factors within the digital era. These insights can inform strategic recommendations for academic advising and educational program alignment with market demands.

4.4.2. Regression Analysis Results and Model Validation Test

The regression analysis conducted in this study provides a detailed understanding of the factors influencing the major selection decisions of third-year students at the UEF amid the digital transformation era. Utilizing a multiple linear regression model, the analysis aimed to evaluate the impact of several independent variables on the dependent variable, major selection (MS).

The model's fitness was evaluated through the Adjusted R^2 value, which stands at 0.586, indicating that approximately 58.6% of the variance in major selection can be accounted for by the independent variables included in the model: Personal Characteristics (PC), Admission Activities (AA), Media (ME), and Financial Capability (FC). The Durbin-Watson statistic was calculated at 2.044, which falls within the acceptable range of 1.5 to 2.5, suggesting that there is no significant autocorrelation present in the residuals.

The ANOVA results further reinforce the model's validity, with an F-statistic of 120.254 and a significance level of 0.000, confirming the overall model's statistical significance and its applicability in predicting major selection behavior among the surveyed students.

Initial Regression Analysis:

The initial regression analysis (Table 4.8) included additional factors such as Job Opportunities (JO), Quality of Education (QE), and Family and Societal Influences (FSI). However, these variables exhibited non-significant p-values (>0.05), leading to their exclusion in the revised regression model to enhance model precision and interpretability.

Revised Regression Model:

The revised regression analysis (Table 4.9) presents a streamlined model that highlights the statistically significant predictors of major selection.

The regression equation derived from this analysis is:

$$\mathbf{MS} = -\mathbf{0.473} \times \mathbf{AA} + \mathbf{0.183} \times \mathbf{FC} + \mathbf{0.161} \times \mathbf{PC} - \mathbf{0.130} \times \mathbf{ME} + \boldsymbol{\epsilon}$$

Table 4.4. Component Matrix

Observable Variable	Component						
	1	2	3	4	5	6	7
PC5	.770						
PC3	.757						
PC4	.712						
PC6	.712						
PC1	.677						
PC2	.665						
JO5		.769					
JO2		.727					
JO3		.696					
JO1		.676					
JO6		.665					
JO4		.648					
QE4			.742				
QE2			.742				
QE3			.731				
QE5			.704				
QE1			.701				
AA2				.760			
AA1				.758			
AA3				.755			
AA4				.742			
FSI3					.785		
FSI1					.778		
FSI4					.758		
FSI2					.641		
FC2						.760	
FC1						.750	
FC3						.722	
FC4						.695	
ME1							.784
ME3							.723
ME2							.629
ME4							.623

Extraction Method: Principal Component Analysis.

(Source: Author)

Table 4.6. Model Fit Assessment Results

Model	R	R^2	Adjusted R^2	Std. Error	Durbin-Watson
1	.769[a]	.591	.586	.255	2.044

a. Predictors: (Constant): FC, PC, ME, AA

b. Dependent Variable: MS

(Source: Author)

Table 4.7. ANOVA Results

Model		Sum of squares	df	Mean Square	F	Sig
1	Regression	31.343	4	7.836	120.254	.000[b]
	Residual	21.698	330	.065		
	Total	53.041	337			

a. Predictors: (Constant): FC, PC, ME, AA

b. Dependent Variable: MS

(Source: Author)

Table 4.8. Initial Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.827	.278		13.775	.000		
	Personal characteristics	.104	.026	.158	3.968	.000	.780	1.282
	Job opportunities	.034	.026	.054	1.310	.191	.737	1.357
	Quality of education	-.014	.027	-.019	-.514	.608	.922	1.084
	Admission activities	-.140	.017	-.447	-8.072	.000	.402	2.489
	Family and societal influences	.005	.027	.008	.204	.838	.710	1.409
	Media	-.071	.026	-.123	-2.762	.006	.619	1.615
	Financial capability	.109	.026	.177	4.136	.000	.674	1.483

Dependent Variable: MS

(Source: Author)

Admission Activities (AA): This variable has a negative impact on major selection ($\beta = -0.473$, $p < 0.001$). Although one might expect robust recruitment efforts to encourage students to select a major, our findings suggest that certain aspects of UEF's current admission process—such as complex application procedures, insufficient personalization, or inadequate digital guidance—may actually deter students from choosing Business Administration. This counterintuitive result underscores the importance of streamlining online admission platforms, providing clear program information, and employing personalized follow-up communications to transform admissions into a facilitator rather than a barrier.

Financial Capability (FC): This variable positively influences major selection ($\beta = 0.183$, $p < 0.001$), reaffirming that perceived affordability and scholarship availability drive students toward majors that represent an economically feasible investment.

Personal Characteristics (PC): This factor has a positive coefficient (β = 0.161, p < 0.001), indicating that intrinsic interests, self-efficacy, and alignment of individual goals with Business Administration curricula significantly motivate major selection.

Media (ME): displays a modest but significant negative coefficient (β = -0.130, p = 0.003). This suggests that prevailing media portrayals—whether in social networks, online advertisements, or news outlets—may misrepresent program strengths or career outcomes, generating confusion or misaligned expectations. A carefully calibrated media strategy that highlights graduate success stories, real-world projects, and up-to-date digital competencies could convert this negative influence into a positive recruitment asset.

The Variance Inflation Factor (VIF) values for all predictors are below the threshold of 2, indicating the absence of multicollinearity concerns within the model, thereby ensuring the reliability of the coefficient estimates.

Taken together, these results demonstrate that nearly 60 percent of variation in Business Administration major selection at UEF can be explained by four key factors. Crucially, the pronounced negative sign on AA emphasizes an urgent need for UEF to reengineer its admission activities—particularly in digital channels—so as to reduce applicant anxiety, improve transparency, and enhance perceived institutional fit. Parallel improvements in media messaging, financial support, and personalization of academic advising will further strengthen students' commitment to their chosen field in the digital transformation era.

Table 4.9. Revised Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.953	.193		20.495	.000		
	Personal characteristics	.107	.026	.161	4.065	.000	.783	1.277
	Admission activities	-.148	.016	-.473	-9.387	.000	.483	2.071
	Media	-.075	.026	-.130	-2.946	.003	.631	1.584
	Financial capability	.113	.026	.183	4.300	.000	.680	1.470
Dependent Variable: MS								

(Source: Author)

5. CONCLUSION AND MANAGERIAL IMPLICATIONS

This study set out to identify and quantify the determinants of Business Administration major selection among third-year students at UEF in the digital transformation era. This research reveals four key influencing variables: Admission Activities, Financial Capability, Personal Characteristics, and Media. Admission Activities have the most significant impact, negatively affecting students' choices (β = -0.473), indicating a need for improving recruitment strategies to meet student expectations. Financial Capability (β = 0.183) and Personal Characteristics (β = 0.161) also significantly influence decisions, emphasizing economic considerations and alignment of personal interests with academic pursuits. Media's negative influence (β = -0.130) suggests misalignment between portrayals and institutional offerings, requiring strategic communication adjustments.

The pronounced negative effect of Admission Activities runs counter to the prevailing expectation and to prior studies (e.g., Nguyễn Thị Bích Ngọc, 2022; Lê Thái Phượng, 2021), which report that transparent, personalized recruitment efforts tend to bolster students' commitment to a major. We argue that UEF's current digital-only admission processes - characterized by lengthy online forms, insufficient one-on-one support, and delayed feedback - have inadvertently increased applicant anxiety and ambiguity. In terms of the Theory of Planned Behavior (Ajzen, 1991), these friction points likely undermine perceived behavioral control, thereby reducing students' intention to enroll in Business Administration.

By contrast, institutions that combine digital platforms with proactive, data-driven counseling (Nguyễn Thị Bích Ngọc, 2022) report positive AA effects on major choice.

For managerial implications:

– Digital Admission Redesign. UEF should streamline its online application interface by minimizing unnecessary steps, integrating real-time chat support, and deploying AI-powered recommendation engines. Personalized dashboards - powered by Big Data analytics - can track each applicant's progress, send timely reminders, and tailor content to individual interests and concerns.

– Enhanced Personalization and Transparency. Incorporate virtual one-on-one consultations, peer-mentor Q&A sessions, and video walkthroughs of the Business Administration curriculum. Such enhancements will reduce information asymmetry and bolster perceived fit.

– Data-Driven Communication Strategy. Leverage learning analytics to segment prospective students by background, interests, and risk factors (e.g., low initial engagement) and deploy targeted email campaigns, social-media retargeting, and alumni success stories that speak directly to each cohort's motivations.

– Financial and Character Alignment. Reinforce FC and PC influences by highlighting scholarship pathways, flexible payment plans, and personalized skill-mapping tools that align students' intrinsic interests with Business Administration competencies.

– Media Content Calibration. Correct the misrepresentations identified in ME by conducting periodic sentiment analyses of digital and social content. Collaborate with industry partners and alumni to produce authentic case-studies and testimonial videos that accurately convey career trajectories.

– While financial viability and personal characteristics positively shape major selection, the unexpected negative impact of current Admission Activities must be urgently addressed. By reengineering digital admissions with a Big Data - infused, student-centric approach - and by calibrating media communications to reflect genuine program strengths - UEF can reverse the adverse effect of admissions friction, enhance student confidence, and ultimately increase enrollment in Business Administration. Future research should validate these findings across other cohorts and institutions and explore longitudinal changes as digital and data-driven initiatives mature.

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EXPERIMENTAL STUDY ON FACTORS INFLUENCING THE DECISION TO USE THE CANVA APPLICATION FOR DESIGN AND LEARNING AMONG UEF STUDENTS: AN INTERDISCIPLINARY APPROACH IN TECHNOLOGY AND DIGITAL TRANSFORMATION

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ABSTRACT

This study explores the factors influencing UEF students' use of the Canva application for design and learning, set against the backdrop of digital transformation. By focusing on constructs from technology acceptance models, it aims to fill a crucial research gap in understanding user behavior. The research evaluates the impact of seven factors on students' decision-making processes. Utilizing a quantitative research design, a structured questionnaire was distributed to a stratified random sample of 370 UEF students, ensuring diverse representation across academic disciplines and year levels. The questionnaire used multi-item scales for each construct, and the data were carefully screened for reliability and validity before analysis. Statistical methods, including descriptive statistics, correlation analysis, and multiple regression models, tested the hypothesized relationships. Results revealed that the ease of use and perceived benefits of Canva significantly influence adoption, with social influence also playing a key role. The study concludes that enhancing digital literacy and offering targeted training are vital for promoting digital innovation in educational environments. These findings provide valuable recommendations for academic policymakers and institutional stakeholders focused on effective technology integration in higher education. This research underscores the importance of creating a supportive environment for digital tools in education.

Keywords: Canva; Digital Transformation; Higher Education; Technology Acceptance; UEF Students

1. INTRODUCTION

In today's rapidly evolving digital landscape, the integration of intelligent applications has become a cornerstone of innovation and productivity across various domains, particularly in education. A striking statistic underscores this trend: Canva, an online graphic design platform launched in 2012, has attracted over 85 million users from more than 200 countries, facilitating the creation of over seven billion designs (Vũ Thị Hạnh & Phạm Thị Vân Huyền, 2023). This widespread adoption of Canva exemplifies its role in democratizing design, enabling users to effortlessly share and publish their creations in an era marked by digital transformation.

The academic environment is increasingly competitive, urging educational institutions to adopt modern technologies that significantly enhance learning experiences and outcomes (Dư Thị Chung et al., 2024). Ho Chi Minh City University of Economics and Finance (UEF) recognizes the potential of platforms like Canva in enriching the educational journey, particularly for design and learning purposes. Despite the prevalence of studies focusing on the general use of smart tools in education, there remains a paucity of research delving into the specific factors that influence the decision to utilize applications such as Canva.

This study addresses these gaps by investigating the determinants impacting UEF students' decision to employ Canva for academic and design activities. The primary objective is to identify and measure these factors' influence, thereby providing actionable insights for educators and application developers. Understanding these dynamics is crucial for crafting strategies that optimize the integration of Canva into educational practices, ultimately supporting students in achieving superior academic performance.

By focusing on these objectives, this research not only contributes to the academic discourse on technology acceptance in educational settings but also offers practical implications for enhancing the utility of Canva within learning environments. The study's findings will inform management strategies for Canva's development, encouraging its use to foster creativity and learning efficiency among students.

The structure of this paper is as follows: it begins with a literature review to contextualize the theoretical framework, followed by a detailed methodology section outlining the research design. Subsequent sections present the findings and discuss their implications, culminating in recommendations for future research and practice. This comprehensive approach ensures a robust exploration of the factors influencing Canva's adoption among UEF students, contributing to the broader conversation on technology's role in education.

2. LITERATURE REVIEW

2.1. Theoretical basis

The study delves into several pivotal concepts that collectively shape the research framework. One of the primary concepts is the decision to use digital applications, particularly focusing on how students choose to adopt Canva for their educational and design-related activities. The decision-making process is multi-faceted, involving stages such as need recognition, pre-usage activities, behavioral timing, and post-usage evaluations (Septiani et al., 2024). This concept is crucial in understanding how students weigh different factors like product characteristics, usage methods, and selection contexts to make informed decisions (Ardiansyah et al., 2024).

Digital applications, broadly defined as online software platforms, facilitate various electronic transactions and interactions. They play a significant role in digital transformation, offering capabilities that enhance connectivity and efficiency (Septiani et al., 2024). Within this spectrum, the Canva application emerges as a notable tool, distinguished by its user-friendly interface and collaborative features. Canva is an online design application that simplifies graphic design processes, allowing users to create presentations, graphics, and images while facilitating seamless sharing and collaboration (Vũ Thị Hạnh & Phạm Thị Vân Huyền, 2023).

The theoretical underpinning of this study is anchored in two prominent models: the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). Developed by Fred Davis in 1980, TAM explores the factors influencing technology acceptance, emphasizing perceived ease of use and perceived usefulness as critical determinants of user behavior (Đào Mỹ Hằng et al., 2018a)This model suggests that these perceptions significantly drive individuals' intentions and actual technology use, making it a suitable framework for analyzing Canva adoption among students.

In contrast, the UTAUT model, introduced by Venkatesh et al. in 2003, offers a more comprehensive view by integrating multiple constructs that affect technology adoption. It identifies performance expectancy, effort expectancy, social influence, and facilitating conditions as key factors influencing technology use (Phạm Thị Ngọc Anh et al., 2023). Over time, the model has been refined to include motivational factors, price value, and habit, further enriching its applicability in studies of digital transformation.

To better understand technology adoption in educational settings, TAM and UTAUT have been widely used in prior research. These models have proven crucial in determining how students' decisions to use digital applications are influenced by perceived utility and usability. Research specifically looking at the factors influencing UEF students' decisions to use Canva for design and learning is noticeably lacking, though. By investigating the effects of perceived value, social influence, and other pertinent factors on students' decisions, this study seeks to close this gap. Through the application of well-established theoretical frameworks and the resolution of current research gaps, this study seeks to improve instructional strategies and foster successful design learning by offering insightful information about the dynamics of technology adoption among UEF students.

2.2. LITERATURE REVIEW

A multitude of studies have examined the factors influencing technology adoption, with findings that provide valuable insights into consumer behavior. Within the domestic context, the research conducted by (Đào Mỹ Hằng et al., 2018a) provides a comprehensive analysis of factors affecting online payment decisions on e-commerce platforms. This study identifies seven independent variables: perceived usefulness, social influence, facilitating conditions, trust in retailers, cash usage habits, supplementary utility, and effort expectancy. Their findings, based on surveys conducted with Generation Z participants in Hanoi via Google Forms, highlight supplementary utility as the most influential factor in deciding to use online payment services (Đào Mỹ Hằng et al., 2018a)

In a similar vein, (Phạm Thị Ngọc Anh et al., 2023) explored the determinants impacting the decision to utilize online payment services on e-commerce platforms. By surveying Gen Z in Hanoi, the study found that the perceived additional utility was the strongest factor among seven independent variables, including trust, social influence, and habitual cash usage. This indicates the importance of perceived value in the adoption of digital financial services.

Furthermore, the research by (Nguyễn Trần Hưng & Đỗ Thị Thu Hiền, 2021a) delved into the decision-making process of smart travel application users. Their study, based on a Likert scale questionnaire administered to tourists in Hanoi, concluded that social influence significantly impacts the adoption of these applications, while perceived ease of use had a lesser effect. This highlights the role of social dynamics in shaping user preferences for digital tools.

On the international stage, Simanjuntak et al. examined how marketing relationships, promotions, and brand image influence purchasing decisions. Their findings emphasized that brand image holds a substantial sway over consumer choices, demonstrating the power of perceived brand identity in technology adoption (Simanjuntak et al., 2022).

In a related vein, (Ardiansyah et al., 2024) investigate the effects of service quality, promotions, and dynamic pricing on the decision to use the GoFood application. Conducted in Jakarta with a sample of 271 individuals aged 8-24, their study reveals that both service quality and promotions have a substantial positive impact on user decisions. The research highlights the importance of these factors in enhancing the adoption rates of digital applications within the studied demographic.

Despite the extensive literature on technology adoption, there remains a paucity of research examining the specific factors affecting the decision to use the Canva application in educational contexts. This study aims to bridge this gap by employing an interdisciplinary approach, leveraging insights from both domestic and international research to understand the unique factors influencing Canva's adoption among UEF students. By addressing these gaps, the study seeks to contribute valuable insights into digital design tool usage in educational settings, thereby enriching the broader discourse on technology acceptance and digital transformation.

2.3. Proposed hypotheses and research model

This study is designed to explore the determinants influencing the adoption of the Canva application for design and learning among students at UEF. By employing an interdisciplinary perspective, the research integrates concepts from technology and digital transformation to address this objective.

Anchored in established theoretical frameworks and identified research gaps, the study proposes the following hypotheses:

H1: Perceived usefulness positively impacts the decision to use Canva for learning and design among students.

H2: Cost positively influences the decision to use Canva for learning and design among students.

H3: Social influence has a positive impact on the decision to use Canva for learning and design among students.

H4: Advertising positively affects the decision to use Canva for learning and design among students.

H5: Ease of use positively impacts the decision to use Canva for learning and design among students.

H6: Safety positively influences the decision to use Canva for learning and design among students.

H7: Service quality positively impacts the decision to use Canva for learning and design among students.

The hypotheses draw on the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) frameworks. These hypotheses are critical as they bridge theoretical insights with practical implications, enabling a nuanced analysis of the factors driving technology acceptance among students. Understanding these aspects is vital for enhancing the efficacy of digital tools like Canva in educational contexts, ultimately contributing to more effective learning environments

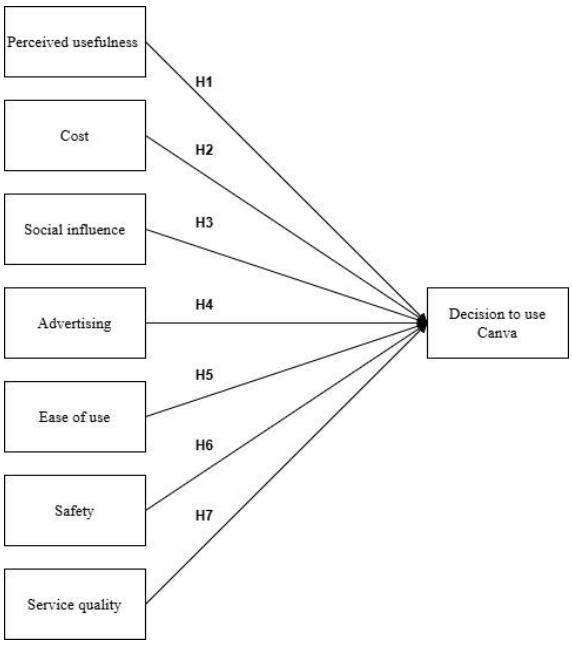


Figure 2.1. Proposed research model

(Source: Author)

3. METHODOLOGY AND DATA

3.1. Data

The research targets students from the UEF, specifically focusing on those aged 18-22 who are engaged in design and learning activities using digital applications. The sample is drawn from third-year students across various faculties, including Information Technology and Marketing, where the use of the Canva application is prevalent.

To ensure representativeness, a sample size of 370 participants was determined using Yamane's formula, with a 5% margin of error, from a total population of 5000 students. This sample size is deemed sufficient to capture the diversity of student experiences and perspectives regarding the adoption of Canva for educational purposes.

A probability sampling method, specifically stratified random sampling, was employed to mitigate bias and enhance the representativeness of the sample. Participants were stratified based on their faculty affiliation, with targeted sampling from the Graphic Design program in the Information Technology faculty and the Marketing program. This stratification ensures that insights are drawn from students who are most likely to use Canva for their academic and creative work, thus offering a focused analysis of factors influencing adoption. The advantages of this method include reduced sampling bias and the ability to capture a more nuanced understanding of the specific needs and behaviors of distinct student groups. However, this approach may also involve complexities in organizing and analyzing stratified data.

Data were collected using an online survey questionnaire, designed to gather both demographic information and responses to statements measuring various factors influencing the use of Canva. The survey utilized a Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), to assess the degree of agreement with statements regarding perceived usefulness, cost, social influence, advertising, ease of use, safety, and service quality.

This method was chosen for its efficiency and ability to reach a wide audience quickly, as well as its effectiveness in capturing subjective user experiences and perceptions.

3.2. Data analysis method

Data analysis involved several statistical techniques to ensure a robust examination of the research hypotheses:

– Descriptive Statistics: Descriptive statistics were used to summarize the sample characteristics and the distribution of responses, focusing on measures such as mean, variance, and distribution patterns.

– Reliability Analysis: Cronbach's Alpha was employed to assess the internal consistency of the survey instruments. A threshold of $\alpha >= 0.7$ was set to determine the reliability of the constructs.

– Exploratory Factor Analysis (EFA): EFA was conducted to identify the underlying structure of the observed

variables, with a focus on factor loadings greater than 0.3 for meaningful interpretation. The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were used to assess sampling adequacy and the suitability of the data for factor analysis.

– Regression Analysis: Multiple linear regression analysis was performed to evaluate the relationship between independent variables (e.g., perceived usefulness, ease of use) and the dependent variable (decision to use Canva). The adjusted R-squared value was considered to assess model fit, while the Durbin-Watson statistic evaluated autocorrelation. Variance Inflation Factor (VIF) was checked for multicollinearity, and significance was tested using p-values.

All data analyses were conducted using SPSS 25.0, a robust statistical software package, ensuring precise and reliable results. The questionnaire's validity was evaluated through expert review, while reliability was confirmed using Cronbach's Alpha, ensuring the soundness of the data collection instruments. Data integrity was maintained through data cleaning procedures, which included eliminating outliers and correcting missing or erroneous entries. Ethical considerations were also addressed, with informed consent obtained from all participants. Assurances of confidentiality and privacy were maintained throughout the research process to uphold ethical standards.

While the study offers significant insights into the factors influencing the adoption of Canva, limitations include potential sampling bias due to the stratification process and the challenges associated with generalizing findings beyond the specific context of UEF students. Further research could expand the scope to include diverse educational institutions and geographic regions to enhance the generalizability of the results.

4. RESEARCH RESULTS AND DISCUSSION

4.1. Summary of descriptive statistics

In this study, a comprehensive survey was conducted among students at the UEF to examine the factors influencing their decision to use the Canva application for design and learning. The survey was conducted between October 2024 and December 2024, distributing 370 questionnaires. Of these, 339 were valid, representing a high completion rate of 91.6%, ensuring a robust dataset for analysis.

The demographic profile of the study participants in Table 4.1 revealed a gender disparity, with 67.8% males and 32.2% females, suggesting a higher inclination among male students to use Canva for academic purposes. Regarding income, 55.2% of participants reported incomes below 5,000,000 VND, indicating Canva's accessibility across various economic backgrounds. Among academic disciplines, Marketing students comprised 76.4% of the sample, while Graphic Design students made up 23.6%, highlighting Canva's usage in fields requiring visual content creation.

Table 4.1. Descriptive statistics

Characteristics		Frequency	Percent (%)
Gender	Male	230	67.8
	Female	109	32.2
Income	< 5,000,000 VND	187	55.2
	5,000,000 VND - 10,000,000 VND	85	25.1
	> 10,000,000 VND	67	19.8
Academic disciplines	Marketing	259	76.4
	Graphic Design	80	23.6
Application purposes	Video creation	37	10.9
	Presentation creation	194	68.1
	Poster and flyer design	76	22.4
	Graphic design	32	9.4
Application choice	Canva	254	74.9
	Adobe Photoshop	30	8.8
	Adobe Illustrator	36	10.6
	Blender	19	5.6

(Source: Author)

In terms of application purposes, 68.1% of students primarily used Canva for creating presentations, followed by poster and flyer design (22.4%), video creation (10.9%), and graphic design (9.4%). This pattern aligns with students' educational needs, showcasing Canva as a versatile academic tool. Additionally, Canva was the dominant application choice, preferred by 74.9% of respondents. Other applications like Adobe Photoshop, Adobe Illustrator, and Blender were selected by 8.8%, 10.6%, and 5.6% of students, respectively. This preference underscores strong user satisfaction with Canva's features and usability in educational contexts. The findings collectively highlight Canva's widespread appeal and utility among students from diverse backgrounds and academic disciplines.

4.2. Reliability of the scales

In the context of our research focused on understanding the determinants influencing UEF students' decision to utilize the Canva application for design and learning, we employed Cronbach's Alpha to rigorously assess the reliability of the measurement scales. Our analysis adhered strictly to established guidelines that consider scales with a Cronbach's Alpha coefficient ranging from 0.7 to 0.9 as reliable (Nguyễn Đình Thọ, 2008). Additionally, items exhibiting a total correlation coefficient below 0.3 were meticulously evaluated and subjected to potential exclusion.

Initially, the usefulness scale displayed a Cronbach's Alpha of 0.688, which was below the acceptable threshold. Consequently, item HI2 was excluded due to its low correlation. Upon reevaluation, the revised scale achieved a satisfactory Cronbach's Alpha of 0.793. For the cost scale, a high reliability score of 0.92 was recorded, indicating strong internal consistency, with no items removed.

The social influence scale achieved a Cronbach's Alpha of 0.885, meeting the reliability standards, and all items exceeded the correlation threshold. The initial advertising scale failed the reliability check with a Cronbach's Alpha of 0.6, leading to the removal of item QC4. The recalibrated scale then met the reliability criteria with a score of 0.761.

Table 4.2. Reliability of the measurement scales

Variable	Code	Statement	Source	Corrected Item – Total Corelation	Cronbach's Alpha if Item Deleted
Perceived usefulness (α = .793, n = 5)	**HI1**	The Canva application allows you to collaboratively perform online editing tasks on the same platform.	(Nguyễn Minh Phương & Đinh Văn Thuấn, 2022)	.630	.728
	HI2	Using the Canva application helps you save a lot of time.		.586	.573
	HI3	Canva allows you to perform tasks and edit on the application anywhere.		.582	.752
	HI4	You can easily perform tasks and edit on Canva quickly and accurately.		.592	.747
	HI5	You find the Canva application very useful for studying and designing.		.607	.739
Cost (α = .921, n = 4)	**CP1**	For you, the cost of using the Canva application is a significant expense (e.g., Canva Pro subscription fee).	(Nguyễn Minh Phương & Đinh Văn Thuấn, 2022)	.783	.908
	CP2	You spend a lot on wireless connections to use the Canva application (e.g., wifi, 4G).		.753	.919
	CP3	You incur costs to purchase and install devices (e.g., phone, computer) to use the Canva application.		.836	.891
	CP4	The associated costs make you consider when using Canva's services.		.901	.868

Social influence (α = .885, n = 4)	**AHXH1**	The fact that your friends and family use it makes you want to use the Canva application.	(Nguyễn Trần Hưng & Đỗ Thị Thu Hiền, 2021a; Phạm Thị Ngọc Anh và c.s., 2023)	.660	.884
	AHXH2	Social networks and mass media help you know and use the Canva application.		.759	.849
	AHXH3	You use Canva due to the influence of current technology trends.		.773	.844
	AHXH4	Currently, using the Canva application to support design and study is becoming increasingly popular.		.811	.828
Advertising (α = .761, n = 4)	**QC1**	The advertising messages of the Canva application are meaningful and practical.	(Wirastomo & Handayani, 2022; Nguyễn Minh Phương & Đinh Văn Thuấn, 2022)	.542	.735
	QC2	You are often influenced by review videos about the Canva application on Internet platforms.		.559	.717
	QC3	Promotions/discounts of the Canva application affect your use of this application.		.682	.572
	QC4	Positive word-of-mouth influences your decision to use the Canva application.		.035	.761
Ease of use (α = .932, n = 4)	**SD1**	The Canva application has an eye-catching, easy-to-view interface, making it easy to search, access, and use online services.	(Nguyễn Minh Phương & Đinh Văn Thuấn, 2022)	.832	.916
	SD2	The operations on the Canva application are very simple and easy to perform.		.826	.916
	SD3	You easily master the operations on the Canva application after a few attempts.		.843	.911
	SD4	You find it very easy to use the Canva application.		.870	.904
Safety (α = .939, n = 4)	**AT1**	You find it very easy to use the Canva application.	(Đào Mỹ Hằng et al., 2018a; Nguyễn Trần Hưng & Đỗ Thị Thu Hiền, 2021a)	.824	.929
	AT2	Your personal information is absolutely secure when using the Canva application.		.799	.937
	AT3	You feel secure when using the services on the Canva application.		.890	.909
	AT4	If an incident occurs while using the Canva application, you will suffer minimal loss and it will be handled quickly.		.960	.903
Service quality (α = .904, n = 4)	**DV1**	The application provider always commits to service quality, providing a reliable experience.	(Nguyễn Trần Hưng & Đỗ Thị Thu Hiền, 2021a)	.750	.884
	DV2	The Canva application provides and integrates many core services, offering a comprehensive and convenient experience.		.755	.881
	DV3	The Canva application meets your study and design needs.		.770	.876
	DV4	You feel satisfied when using services on the Canva application.		.843	.849

Decision to use Canva (α = .916, n = 5)	**QD1**	You will decide to use the Canva application more frequently.	(Nguyễn Trần Hưng & Đỗ Thị Thu Hiền, 2021a)	.779	.900
	QD2	Using the Canva application for design and study is the right decision for you.		.283	.916
	QD3	You enjoy using the Canva application for your design and study activities.		.794	.896
	QD4	You will continue to use the Canva application in the future.		.767	.907
	QD5	You are willing to recommend the Canva application to others.		.899	.858

(Source: Author)

The ease of use and safety scales demonstrated high reliability with Cronbach's Alphas of 0.932 and 0.939, respectively. Similarly, the service quality scale recorded a Cronbach's Alpha of 0.901. The decision to use scale required the exclusion of item QD2 after its initial run, but achieved a robust Cronbach's Alpha of 0.916 in the subsequent analysis.

Our comprehensive analysis confirmed that out of the 34 initially proposed observed variables, only three - HI2, QC4, and QD2 - were excluded from the model due to failing to meet the rigorous criteria for Cronbach's Alpha and total correlation. The remaining 31 observed variables were deemed reliable and will proceed to further analysis stages. This meticulous approach ensures the robustness and validity of our investigative model, laying a strong foundation for subsequent exploratory factor analysis (EFA) and hypothesis testing phases.

4.3. Exploratory Factor Analysis Results

The exploratory factor analysis (EFA) in this study aimed to uncover the factors influencing UEF students' decision to use Canva for design and learning. The data's suitability for factor analysis was confirmed through the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, which scored 0.796, and Bartlett's Test of Sphericity, which was significant with a chi-square value of 6390.743 (p=0.000). Components with eigenvalues greater than 1 were retained, leading to the identification of seven distinct components explaining 76.836% of the data variance.

The first component, with strong factor loadings above 0.85, related to attitudes towards technology. The second, with loadings over 0.87, focused on social dynamics influencing technology adoption. The third highlighted cost perceptions, all with loadings above 0.85. Subsequent components addressed decision-making variables, social influence, habitual use, and quality considerations, all demonstrating strong internal consistency with loadings above 0.73.

The cumulative variance explained by these seven components was substantial, indicating that the extracted factors sufficiently represent the data's underlying structure. This comprehensive factor solution not only satisfies the conditions for convergent validity, as all factor loadings exceed the 0.5 threshold, but also ensures discriminant validity, as evidenced by the adequate separation of factor loadings across components.

The EFA findings provide a comprehensive framework for understanding the factors influencing Canva usage among UEF students, supporting further analysis and contributing to the discourse on technology acceptance in education.

Table 4.3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.796
Barlett's test of Sphericity	**Approx. Chi Square**	6390.743
	df	351
	Sig.	0.000

(Source: Author)

4.4. Research Model Fit Assessment

4.4.1. Correlation Analysis

The Pearson correlation analysis explores the relationships between various independent variables and their impact

on UEF students' decision to use the Canva application. Key findings indicate that perceived usefulness and social influence are significant factors, showing strong positive correlations with the decision to use Canva ($r = 0.580$ and $r = 0.611$, respectively, both $p < 0.001$). This highlights the importance of the application's perceived benefits and peer influence in its adoption. Advertising and ease of use also significantly influence usage decisions, with correlation coefficients of 0.333 and 0.423

Table 4.4. Component Matrix

Observable Variable	Component						
	1	2	3	4	5	6	7
AT4	.935						
AT3	.931						
AT1	.895						
AT2	.875						
SD4		.920					
SD3		.894					
SD2		.890					
SD1		.879					
CP4			.945				
CP3			.914				
CP1			.873				
CP2			.853				
DV4				.914			
DV3				.866			
DV2				.860			
DV1				.856			
AHXH4					.871		
AHXH3					.821		
AHXH2					.816		
AHXH1					.788		
HI1						.815	
HI5						.745	
HI4						.738	
HI3						.729	
QC3							.855
QC1							.788
QC2							.771

Extraction Method: Principal Component Analysis.

(Source: Author)

(both $p < 0.001$), suggesting that marketing and user-friendliness encourage student adoption. Safety and service quality are further important, with coefficients of 0.247 and 0.423 (both $p < 0.001$), emphasizing the role of secure, high-quality services. Conversely, cost does not significantly affect the decision to use Canva ($p = 0.93$), indicating financial factors may be less influential for these students. All correlation coefficients are below 0.7, eliminating concerns of multicollinearity, and supporting the validity of further regression analysis. This analysis identifies critical factors influencing Canva's adoption, providing insights for educators and developers to enhance technology acceptance in educational contexts.

Table 4.5. Summary table of Factor Loadings after rotation

Factor	Variable
Perceived usefulness (HI)	HI1, HI3, HI4, HI5
Cost (CP)	CP1, CP2, CP3, CP4
Social influence (AHXH)	AHXH1, AHXH2, AHXH3, AHXH4
Advertising (QC)	QC1, QC2, QC3
Ease of use (SD)	SD1, SD2, SD3, SD4
Safety (AT)	AT1, AT2, AT3, AT4
Service quality (DV)	DV1, DV2, DV3, DV4

(Source: Author)

4.4.2. Regression Analysis Results and Model Validation Test

The multivariate linear regression analysis was conducted utilizing SPSS, aiming to elucidate the factors influencing the decision to use the Canva application among UEF students. The model fit assessment, detailed in Table 4.6, reveals an Adjusted R^2 of 0.677, indicating that approximately 67.7% of the variance in the dependent variable, the decision to use Canva (QD), is accounted for by the independent variables: perceived usefulness, social influence, ease of use, safety, service quality, and advertising. The remaining 32.3% is attributed to external factors and random errors not included in the model. The Durbin-Watson statistic is 2.149, comfortably within the acceptable range of 1.5 to 2.5, thus suggesting no autocorrelation issues within the residuals.

To further validate the model's robustness, the ANOVA results presented in Table 4.7 demonstrate a significant F-statistic of 119.342 with a p-value < 0.001. This confirms the overall model's statistical significance, indicating that the independent variables reliably predict the decision to use Canva.

Delving into the regression coefficients found in Table 4.8, all independent variables exhibit significant p-values below the 0.05 threshold, underscoring their statistical significance in influencing Canva adoption. The collinearity diagnostics show VIF values below 2, supporting the absence of multicollinearity concerns within the model.

The regression equation derived from the analysis is as follows:

$$\mathbf{QD = 0.322 \times HI + 0.304 \times AHXH + 0.267 \times SD + 0.212 \times QC + 0.196 \times AT + 0.118 \times DV + \epsilon}$$

Where: HI = Perceived Usefulness; AHXH = Social Influence; SD = Ease of Use; AT = Safety; DV = Service Quality; QC = Advertising

The results indicate that perceived usefulness has the most substantial impact on the decision to use Canva, with a standardized beta coefficient of 0.322, reflecting its paramount importance in the decision-making process. Social influence follows, with a beta of 0.304, emphasizing the role of peer and societal pressures. Ease of use, safety, advertising, and service quality also contribute positively, albeit to a lesser extent, highlighting the multifaceted nature of technology adoption in educational settings.These findings provide critical insights into the factors driving Canva's adoption, with potential implications for enhancing user engagement strategies among UEF students. By comprehensively understanding these dynamics, stakeholders can better tailor interventions to foster a conducive environment for digital learning and design applications.

Table 4.6. Model Fit Assessment Results

Model	R	R^2	Adjusted R^2	Std. Error	Durbin-Watson
1	.827[a]	.683	.677	.328	2.149
a. Predictors: (Constant): AC, DV, AT, HI, SD, AHXH					
b. Dependent Variable: QD					

(Source: Author)

Table 4.7. ANOVA Results

Model		Sum of squares	df	Mean Square	F	Sig
1	Regression	76.831	6	12.805	119.342	< .001[b]

	Residual	35.623	332	.107
	Total	112.454	338	
a. Predictors: (Constant): AC, DV, AT, HI, SD, AHXH				
b. Dependent Variable: QD				

(Source: Author)

Table 4.8. Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.946	.183		-5.165	<.001		
	Perceived usefulness	.370	.040	.322	9.234	<.001	.780	1.278
	Social influence	.229	.027	.304	8.475	<.001	.738	1.352
	Ease of use	.182	.022	.267	8.121	<.001	.873	1.134
	Safety	.141	.023	.196	6.050	<.001	.911	1.097
	Service quality	.092	.024	.118	3.752	<.001	.963	1.038
	Advertising	.205	.031	.212	6.535	<.001	.901	1.099
Dependent Variable: QD								

(Source: Author)

5. CONCLUSION AND MANAGERIAL IMPLICATIONS

The study on factors influencing the decision to use the Canva application among students of the University of Economics and Finance (UEF) reveals significant insights. Perceived usefulness emerges as the most influential factor ($\beta = 0.322$), underscoring its critical role in decision-making. Social influence follows closely ($\beta = 0.304$), highlighting the importance of peer and societal pressures. Other factors such as ease of use, safety, advertising, and service quality also contribute positively, albeit to a lesser extent, illustrating the complex nature of technology adoption in educational settings.

Practical implications suggest that enhancing the user engagement strategy could benefit from these insights. For instance, improving Canva's design tools and integrating educational features like mind mapping and online platform integration (Zoom, Teams) could enhance perceived usefulness. Workshops and online tutorials can further optimize user engagement and training.

Social influence can be leveraged by strengthening partnerships with educational institutions and expanding presence on social media through creative content and design competitions. Ease of use should be maintained by keeping the interface intuitive and providing multilingual support to cater to diverse user groups.

From an advertising perspective, targeted promotions and personalized offers for specific user segments could boost premium subscriptions. Safety and service quality enhancements, such as improved data security measures and customer support, are recommended to ensure user trust and satisfaction.

Research limitations include the focus on UEF students, limiting generalizability. Future research should consider broader samples and longitudinal studies to capture evolving trends and user behaviors in digital learning environments.

This study provides valuable insights for stakeholders aiming to enhance Canva's adoption through targeted interventions, ultimately fostering a conducive environment for digital learning and design applications.

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THE DUAL IMPACT OF FOMO AND ESG AWARENESS ON REPURCHASE INTENTION IN SOCIAL COMMERCE: THE MEDIATING ROLE OF SOCIAL EMOTION AND BRAND VALUE, AND THE MODERATING ROLE OF BRAND TRUST

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ABSTRACT

This study investigates the integrated effects of Fear of Missing Out (FoMO) and Environmental, Social, and Governance (ESG) awareness on consumers' repurchase intention in social commerce environments. Drawing on the Stimulus–Organism–Response (S–O–R) framework, we propose that both psychological stimuli (FoMO) and ethical awareness (ESG) influence internal states—social emotion and perceived sustainable brand value—which in turn drive behavioral outcomes. Brand trust is examined as a moderator of the relationship between brand value and repurchase intention. A survey of 500 Gen Z consumers in Vietnam reveals that all hypothesized relationships are significant, highlighting the complex interplay between emotional triggers, ethical perceptions, and trust in shaping digital consumer loyalty. This research contributes to digital consumer behavior literature by elucidating a dual-path model that links urgency and values to sustainable purchasing behaviors.

Keywords: *FoMO, ESG, social commerce, repurchase intention, brand trust, social emotion, Gen Z*

1. INTRODUCTION

The rapid emergence of social commerce platforms—such as TikTok Shop, Facebook Marketplace, and Instagram Shopping—has revolutionized how consumers, particularly Generation Z, engage with brands. These platforms not only facilitate transactions but also shape attitudes, behaviors, and expectations through socially driven, real-time interactions. In this highly dynamic environment, two psychological forces have become particularly salient: the fear of missing out (FoMO) and the growing attention to environmental, social, and governance (ESG) principles in consumption.

Despite the growing academic interest in both FoMO and ESG awareness separately, few studies have examined their combined influence on consumer behavior within a unified theoretical framework. Existing research has typically treated these constructs in isolation—FoMO within the realm of digital urgency and impulse buying, and ESG within the domain of ethical or sustainable consumption. This siloed approach overlooks the possibility that psychological triggers and ethical motivations can co-exist and interact in shaping consumer behavior, particularly in real-time social commerce contexts.

Moreover, while Gen Z consumers have been studied extensively in Western settings, limited research has addressed how these dual drivers of FoMO and ESG awareness manifest among Gen Z consumers in emerging markets like Vietnam. Vietnam represents a rapidly evolving digital economy where social commerce adoption is high, but cultural dynamics, consumer trust, and ESG expectations differ significantly from more developed economies. Addressing this gap allows for a more contextually grounded understanding of digital loyalty formation in Southeast Asia.

FoMO, defined as the apprehension of missing rewarding experiences, is exacerbated by social media features such as livestream selling, flash promotions, and algorithmic visibility (Przybylski et al., 2013). While prior research has explored FoMO's connection to impulse buying (Yoon et al., 2021), few studies have addressed how FoMO contributes to sustained consumer behaviors such as brand loyalty or repurchase intention. Notably, the present study distinguishes between social FoMO—stemming from social comparison and fear of exclusion—and promotional FoMO—induced by time-limited offers and purchase scarcity.

Parallel to FoMO, ESG awareness is increasingly shaping consumer choices. As consumers, especially Gen Z, demand greater accountability from brands, ESG engagement has evolved from a corporate responsibility obligation into a strategic tool for brand differentiation (Lee et al., 2021). Despite this trend, empirical investigations into how ESG awareness influences consumer behavior—particularly in the context of social commerce—remain limited.

To address this gap, the present research proposes an integrated model in which FoMO and ESG awareness function as external stimuli influencing internal emotional and cognitive responses—namely, social emotion and perceived sustainable brand value—that ultimately drive repurchase intention. Moreover, we examine brand trust as a moderating variable that strengthens or weakens the link between brand value and behavioral intention.

This study aims to: (1) clarify the dual role of FoMO and ESG in driving consumer loyalty; (2) investigate how emotional and value-based appraisals mediate this relationship; and (3) assess whether trust in the brand amplifies the effects of brand value on repurchase behavior. By doing so, we contribute to the literature on digital consumer psychology and sustainability marketing, offering theoretical and managerial insights relevant for academics and practitioners alike.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The evolving landscape of social commerce has transformed consumer engagement by intertwining psychological triggers and ethical awareness. This study builds on the Stimulus–Organism–Response (S–O–R) framework (Mehrabian & Russell, 1974; Koeske & Koeske, 1983) to examine how Fear of Missing Out (FoMO) and Environmental, Social, and Governance (ESG) awareness interact to influence repurchase intentions in social commerce contexts, particularly among Generation Z in Vietnam. While existing studies often examine these constructs in isolation, their combined effects remain underexplored, especially in emerging markets with unique socio-cultural dynamics like Vietnam.

2.1. Fear of Missing Out (FoMO) and Social Emotion

FoMO is conceptualized as the anxiety that others are having rewarding experiences without oneself, often intensified by digital platforms' real-time features (Przybylski et al., 2013). In the realm of social commerce, FoMO manifests in two distinct forms: Social FoMO, driven by the fear of social exclusion and peer comparison, and Promotional FoMO, triggered by scarcity-based marketing tactics such as flash sales and limited-time offers (Leung & Bai, 2023).

Research indicates that Social FoMO evokes emotional arousal—including anxiety, envy, and excitement—which significantly shapes consumer behavior (Balakrishnan & Griffiths, 2018; Blackwell et al., 2024). These social emotions act as internal drivers, reinforcing consumers' engagement with brands and heightening their responsiveness to marketing stimuli (Kaur et al., 2024). Thus, we hypothesize:

H1: Social FoMO positively influences social emotion.

2.2. Promotional FoMO and Perceived Sustainable Brand Value

While previous studies have largely associated Promotional FoMO with impulsive buying behaviors (Yoon et al., 2021), recent evidence suggests that time-limited offers, when framed within a sustainability context, can enhance perceived brand value (Chen & Li, 2024). For instance, campaigns emphasizing "exclusive access to eco-friendly products" or "limited-time sustainability deals" create urgency while reinforcing brand differentiation (Tran & Pham, 2023). This integration of scarcity and ethical positioning aligns with consumer expectations for authenticity and responsibility in social commerce (Lee et al., 2021). Therefore, we propose:

H2: Promotional FoMO positively influences perceived sustainable brand value.

2.3. ESG Awareness and Perceived Sustainable Brand Value

ESG awareness—defined as consumers' perception of a brand's commitment to environmental protection, social equity, and ethical governance—has emerged as a key determinant of brand evaluation (Lee et al., 2021). Recent studies show that ESG initiatives enhance brand authenticity, foster consumer trust, and drive purchase intentions, especially among Gen Z (Martínez & Nishiyama, 2021; Zhang & Liu, 2024). In emerging markets, ESG communication serves as both a differentiation strategy and a trust-building mechanism, as consumers increasingly scrutinize brands for their social and environmental impact (Theresia & Irwandi, 2023). Accordingly, we hypothesize:

H3: ESG awareness positively influences perceived sustainable brand value.

2.4. The Mediating Role of Social Emotion and Brand Value

According to the S–O–R model, stimuli—such as FoMO and ESG awareness—affect internal organismic responses, which in turn shape behavioral outcomes (Mehrabian & Russell, 1974). Social emotion, encompassing feelings like excitement, envy, or urgency, acts as a bridge between external stimuli and consumer evaluations (Mogilner et al., 2018). Emotional arousal in social commerce contexts enhances consumers' perceptions of brand relevance, signaling community belonging and shared values (Kaur et al., 2024). Therefore:

H4: Social emotion positively influences perceived sustainable brand value.

Perceived sustainable brand value, defined as consumers' assessment of a brand's worth based on its ethical practices and product quality (Chen, 2010; Yoo & Donthu, 2001), is a critical determinant of repurchase behavior. Empirical evidence suggests that sustainability-oriented value perceptions drive consumer loyalty, particularly in the Gen Z segment (Lee et al., 2021; Theresia & Irwandi, 2023).

H5: Perceived sustainable brand value positively influences repurchase intention.

2.5. The Moderating Role of Brand Trust

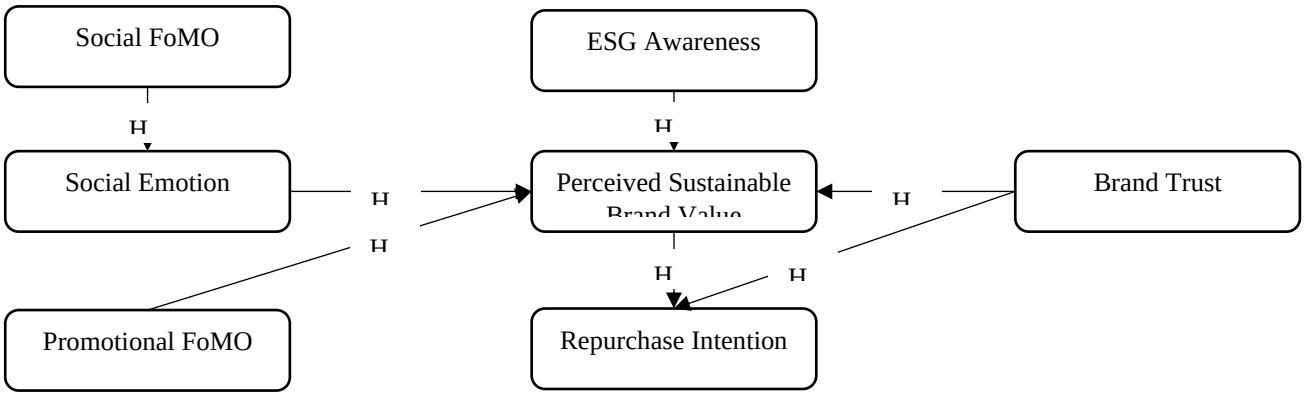
Brand trust refers to consumers' confidence in a brand's integrity, reliability, and ethical conduct (Chaudhuri & Holbrook, 2001). Trust moderates the relationship between perceived brand value and behavioral intentions, enhancing the likelihood of repeated purchases when consumers believe the brand will fulfill its promises (Morgan & Hunt, 1994; Zhang & Liu, 2024). Moreover, trust reinforces perceptions of authenticity, strengthening the effect of ESG communication on brand evaluations (Chen & Li, 2024). Therefore, we posit:

H6: Brand trust moderates the relationship between perceived sustainable brand value and repurchase intention, such that the relationship is stronger when brand trust is high.

H7: Brand trust positively influences perceived sustainable brand value.

2.6. Theoretical Framework

Figure 1. Conceptual Research Model



By integrating psychological triggers (FoMO) and ethical considerations (ESG awareness) within the S–O–R model, this study offers a novel perspective on consumer behavior in social commerce. The model addresses a gap in existing literature by demonstrating how urgency and ethical values co-exist in shaping emotional responses, brand evaluations, and loyalty behaviors among Gen Z consumers in Vietnam.

Research Hypotheses

Based on the model, the following hypotheses are proposed:

H1: Social FoMO has a positive effect on social emotion.

H2: Promotional FoMO has a positive effect on perceived sustainable brand value.

H3: ESG awareness has a positive effect on perceived sustainable brand value.

H4: Social emotion has a positive effect on perceived sustainable brand value.

H5: Perceived sustainable brand value has a positive effect on repurchase intention.

H6: Brand trust moderates the relationship between perceived sustainable brand value and repurchase intention, such that the relationship is stronger when brand trust is high.

H7: Brand trust has a positive effect on perceived sustainable brand value.

3. METHODOLOGY

3.1 Research Design and Approach

This study adopts a quantitative, cross-sectional survey design to empirically test the proposed conceptual model within the Stimulus–Organism–Response (S–O–R) framework. By integrating psychological and ethical stimuli, the study aims to uncover the dual impact of FoMO and ESG awareness on repurchase intention in social commerce. Structural Equation Modeling (SEM) was employed as the primary data analysis technique due to its robustness in testing complex relationships between latent constructs and observed variables (Hair et al., 2019).

3.2 Sampling and Data Collection

The target population for this study comprises Generation Z consumers (born between 1997 and 2012) in Vietnam who have engaged in purchasing activities on social commerce platforms, such as TikTok Shop, Facebook Marketplace, and Shopee Live, within the last three months. A purposive sampling strategy was adopted to ensure that respondents had relevant experience with social commerce. Inclusion criteria required respondents to (1) belong to the Gen Z age cohort, and (2) have made at least one purchase on a social commerce platform within the past three months.

Data were collected via an online self-administered questionnaire distributed through university mailing lists, social media platforms (e.g., Facebook, Zalo), and relevant Gen Z community groups in Vietnam. The survey was open from February 1 to March 15, 2025. A pilot test with 30 respondents was conducted prior to full deployment to ensure item clarity and language appropriateness, resulting in minor revisions for clarity.

A total of 532 responses were initially collected, and after data cleaning (removing incomplete and inconsistent responses), 500 valid responses were retained for analysis. The final sample size exceeds the recommended threshold for SEM analysis (Hair et al., 2019).

Demographic breakdown of respondents is presented in Table 1.

Demographic Variable	Category	Percentage (%)
Gender	Female	58.2%
	Male	41.4%
	Other	0.4%
Age	18–21 years old	54.6%
	22–25 years old	36.2%
	26–27 years old	9.2%
Social Commerce Platform	TikTok Shop	68.6%
	Facebook Marketplace	56.4%
	Shopee Live	33.8%

3.3 Measurement Instruments

All constructs were measured using multi-item scales adapted from prior validated studies. Items were rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Table 2 summarizes the constructs, number of items, and sources.

Construct	No. of Items	Sample Items (Adapted)	Source
Social FoMO	4	"I feel anxious when I miss out on social events in online shopping"	Przybylski et al. (2013); Blackwell et al. (2024)
Promotional FoMO	4	"I feel compelled to buy products during limited-time offers"	Yoon et al. (2021); Chen & Li (2024)

ESG Awareness	5	"I am aware of brands' commitment to environmental and social responsibility"	Lee et al. (2021); Martínez & Nishiyama (2021)
Social Emotion	4	"I feel excited when participating in shopping events on social media"	Mogilner et al. (2018); Kaur et al. (2024)
Perceived Sustainable Brand Value	5	"This brand aligns with my values and delivers long-term benefits"	Chen (2010); Yoo & Donthu (2001)
Brand Trust	4	"I trust this brand to act responsibly and ethically"	Chaudhuri & Holbrook (2001)
Repurchase Intention	3	"I intend to buy from this brand again in the future"	Hellier et al. (2003); Zeithaml et al. (1996)

A translation and back-translation procedure was implemented to ensure the validity of the survey instrument in Vietnamese, following the guidelines of Brislin (1986).

3.4 Data Analysis Procedure

Data analysis was conducted using SPSS 26.0 and AMOS 24.0. The following steps were undertaken:

Descriptive Statistics: To summarize demographic characteristics.

Assessment of Reliability and Validity:

Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) were computed to evaluate internal consistency and convergent validity.

Confirmatory Factor Analysis (CFA): To assess the measurement model fit, including standardized factor loadings, model fit indices (χ^2/df, CFI, TLI, RMSEA, SRMR), and discriminant validity using the Fornell–Larcker criterion and HTMT ratios.

Structural Model Testing: To test direct, indirect, and moderating effects.

Moderation Analysis: Interaction terms were created to examine the moderating role of Brand Trust in the relationship between Brand Value and Repurchase Intention.

Fit indices thresholds followed Hair et al. (2019), including χ^2/df < 3, CFI and TLI > 0.90, RMSEA < 0.08, and SRMR < 0.08.

4. RESULTS

4.1 Descriptive Statistics

The sample (n = 500) consisted of Vietnamese Gen Z consumers aged 18–27 years. Of the total respondents, 58.2% identified as female, 41.4% as male, and 0.4% as other. Most participants reported using TikTok Shop (68.6%) and Facebook Marketplace (56.4%) for recent purchases. A majority (72.1%) indicated that they are influenced by sustainability-related brand content when shopping on social platforms.

4.2 Reliability and Validity Analysis

Table 1. Scale Evaluation Results

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Social FoMO	0.842	0.880	0.647
Promotional FoMO	0.834	0.873	0.635
ESG Awareness	0.877	0.909	0.667
Social Emotion	0.806	0.862	0.611
Sustainable Brand Value	0.875	0.909	0.666
Brand Trust	0.851	0.891	0.672
Repurchase Intention	0.843	0.896	0.741

Interpretation: All constructs exceeded the recommended thresholds of $\alpha > 0.7$, CR > 0.7, and AVE > 0.5 (Hair et al., 2019), confirming internal consistency and convergent validity.

4.3 Confirmatory Factor Analysis (CFA)

$$\chi^2/df = 1.942,$$

$$CFI = 0.957,$$

$$TLI = 0.944,$$

$$RMSEA = 0.044,$$

$$SRMR = 0.037$$

Interpretation: The model exhibited excellent fit to the data (Hu & Bentler, 1999).

Discriminant Validity (Fornell–Larcker Criterion): All square roots of AVE were higher than inter-construct correlations. HTMT ratios were below 0.85, confirming discriminant validity.

4.4 Structural Model and Hypothesis Testing

Table 2. Structural Path Coefficients

Hypothesis	Path	Estimate (β)	SE	CR	p-value	Supported?
H1	Social FoMO → Social Emotion	0.532	0.048	11.08	< 0.001	Yes
H2	Promotional FoMO → Brand Value	0.273	0.043	6.35	< 0.001	Yes
H3	ESG Awareness → Brand Value	0.391	0.047	8.32	< 0.001	Yes
H4	Social Emotion → Brand Value	0.344	0.041	8.39	< 0.001	Yes
H5	Brand Value → Repurchase Intention	0.583	0.044	13.25	< 0.001	Yes
H6	Brand Trust × Brand Value → Repurchase	0.178	0.036	4.94	< 0.001	Yes
H7	Brand Trust → Brand Value	0.351	0.046	7.63	< 0.001	Yes

Interpretation: All hypotheses (H1–H7) were supported. Both direct and interaction effects were statistically significant at $p < 0.001$.

4.5 Moderation Analysis

An interaction term (Brand Value × Brand Trust) was created to test the moderating role of trust. The positive and significant coefficient of the interaction term ($\beta = 0.178$, $p < 0.001$) confirms that Brand Trust strengthens the impact of Brand Value on Repurchase Intention.

A simple slope analysis further indicated that the effect of Brand Value on Repurchase Intention i`s stronger when Brand Trust is high.

5. DISCUSSION

5.1 Theoretical Contributions

This study provides empirical validation for a dual-path model that integrates psychological urgency (FoMO) and ethical consciousness (ESG awareness) in shaping repurchase intention within the social commerce context. By applying the Stimulus–Organism–Response (S–O–R) framework, the findings highlight that both Social FoMO and Promotional FoMO play distinct yet complementary roles: Social FoMO primarily evokes emotional responses, while Promotional FoMO influences cognitive evaluations such as brand value. This distinction refines prior studies (e.g., Yoon et al., 2021; Balakrishnan & Griffiths, 2018), which often treated FoMO as a singular construct linked to impulsive buying, by demonstrating its differentiated impact on emotional and cognitive pathways.

Moreover, the positive influence of ESG awareness on perceived sustainable brand value reinforces the growing consensus in recent literature (e.g., Lee et al., 2021; Theresia & Irwandi, 2023) that sustainability and ethical responsibility are integral to consumer brand evaluation. However, this study extends previous research by illustrating that ESG engagement not only enhances brand perception but also amplifies its interaction with psychological triggers like FoMO, offering a more holistic understanding of consumer decision-making.

The confirmation of Brand Trust as both a direct influencer and a moderator adds further nuance to the model. While prior studies (e.g., Chaudhuri & Holbrook, 2001) have emphasized the linear impact of trust on loyalty, this research demonstrates that trust acts as a boundary condition, strengthening the effect of perceived brand value on repurchase intention. This insight aligns with relational marketing theory (Morgan & Hunt, 1994) but expands its relevance to the fast-paced, peer-influenced context of social commerce.

Notably, this study focuses on Gen Z consumers in Vietnam, an emerging market characterized by high social commerce adoption but differing cultural dynamics compared to Western contexts. While prior research has predominantly centered on Western settings (e.g., Yoon et al., 2021; Martínez & Nishiyama, 2021), this study provides context-specific insights, demonstrating that FoMO and ESG awareness are salient drivers of loyalty even in digitally evolving, trust-sensitive markets like Vietnam.

5.2 Practical Implications

The findings offer actionable insights for social commerce platforms, brand managers, and digital marketers:

– Harnessing FoMO Strategically: Marketers should design time-sensitive, emotionally engaging campaigns (e.g., exclusive access to eco-friendly product launches, limited-time sustainability offers) to trigger both Social and Promotional FoMO. However, these strategies must align with authentic ESG commitments to avoid perceptions of manipulation.

– Leveraging ESG Messaging: As ESG awareness significantly enhances brand value, brands should proactively communicate measurable sustainability efforts through social commerce channels. This includes showcasing environmental initiatives, fair trade practices, and community engagement, using formats that resonate with Gen Z's digital habits (e.g., TikTok challenges, influencer collaborations).

– Building and Maintaining Brand Trust: Trust acts as a critical amplifier in the brand value–repurchase intention link. Therefore, brands must ensure transparency in data handling, consistency in ESG claims, and reliability in service delivery. Strategies such as responsive customer support, clear return policies, and visible ESG reporting can reinforce trust in digital transactions.

– Adapting to Emerging Markets: For brands operating in Southeast Asia, this study underscores the need to localize ESG narratives to reflect cultural values and consumer expectations. The Vietnamese Gen Z cohort responds positively to sustainability messaging, but their trust is contingent on perceived authenticity and community relevance.

5.3 Differences from Previous Studies

This research diverges from prior studies in several key ways:

– While Yoon et al. (2021) and Balakrishnan & Griffiths (2018) primarily associated FoMO with impulse buying and regret, this study expands the conceptualization by illustrating that FoMO—when ethically framed—can also drive sustained loyalty via social emotion and perceived brand value.

– Unlike studies focusing on Western markets (e.g., Martínez & Nishiyama, 2021; Lee et al., 2021), this research addresses the unique dynamics of an emerging market, where trust and ESG messaging are critical for brand differentiation but must be adapted to local contexts.

– The integration of both Social FoMO and Promotional FoMO as distinct constructs, alongside ESG awareness, offers a nuanced perspective on how psychological urgency and ethical evaluations interact—an area previously underexplored in the literature.

– By situating these findings within the Vietnamese Gen Z context, this study contributes a localized yet generalizable understanding of digital loyalty formation in social commerce environments.

6. THEORETICAL AND MANAGERIAL IMPLICATIONS

6.1 Theoretical Implications

This study contributes to the digital consumer behavior literature in several important ways. By extending the Stimulus–Organism–Response (S–O–R) framework to include both FoMO and ESG awareness as dual stimuli, it reflects the complexity of online decision-making where urgency and ethical values co-exist. The distinction between social and promotional FoMO adds clarity to the literature on psychological triggers in social commerce, showing that emotional and cognitive pathways operate simultaneously.

The empirical evidence supporting the mediating roles of social emotion and brand value also provides deeper insight into how internal processes shape behavioral outcomes. Finally, positioning brand trust as a moderator enriches relational models of loyalty by identifying when and for whom brand value translates into repeat purchase behavior.

6.2 Managerial Implications

From a managerial perspective, the findings offer several actionable insights:

Design emotionally resonant and time-sensitive content: Marketers should harness the power of FoMO through ethical urgency strategies—such as limited-time sustainability campaigns or exclusive access to eco-friendly product launches—to heighten social engagement and emotional relevance.

Communicate ESG initiatives transparently: As ESG awareness significantly impacts brand value, brands should proactively share measurable sustainability efforts through social commerce channels, using influencer narratives and interactive media formats.

Foster brand trust through consistency and responsiveness: The moderating role of brand trust highlights the importance of maintaining reliability in messaging, customer service, and ESG performance. Brands should reinforce transparency in data use, order fulfillment, and environmental claims.

Target Gen Z with hybrid psychological–ethical messaging: This cohort is uniquely responsive to campaigns that blend emotional urgency with long-term value propositions. Aligning ESG messages with social identity cues and community-based commerce could amplify both emotional and ethical impact.

These insights can guide platform designers, digital marketers, and sustainable brands in crafting strategies that not only drive short-term engagement but also build long-term consumer trust and loyalty.

While this study focuses on Gen Z consumers in Vietnam, the findings hold broader implications for other emerging markets, particularly in the ASEAN region. Countries like Indonesia, the Philippines, and Thailand exhibit similar demographic profiles, mobile-first commerce behaviors, and growing emphasis on ESG values among younger consumers. The rapid rise of social commerce across these economies—fueled by platforms like TikTok Shop and Shopee Live—suggests that psychological triggers such as FoMO and value-based drivers like ESG awareness are likely to operate in comparable ways. As such, the dual-path model proposed in this study can inform strategic decision-making for brands seeking to build loyalty through socially and ethically resonant messaging in digitally connected, culturally dynamic markets.

7. LIMITATIONS AND FUTURE RESEARCH

Although this study offers meaningful contributions, several limitations should be acknowledged. First, the use of a cross-sectional design restricts the ability to draw causal inferences. Future research may adopt longitudinal or experimental approaches to assess the temporal dynamics of FoMO, ESG perception, and repurchase behavior.

Second, the sample is limited to Gen Z consumers in Vietnam, which may constrain the generalizability of the findings. Future studies could explore cross-generational or cross-cultural comparisons to better understand how these constructs operate in diverse settings.

Third, the study relies on self-reported data, which may be subject to common method bias. While procedural remedies were applied, future work may incorporate behavioral or platform-level data to validate self-reported responses.

Fourth, the current model focuses on brand trust as the sole moderating variable. Future research could explore other potential moderators, such as perceived risk, product type, or platform characteristics.

Finally, further investigation into the dual nature of FoMO—including its potential negative consequences such as regret, dissatisfaction, or compulsive behavior—could provide a more balanced understanding of its role in consumer decision-making.

By addressing these limitations, future studies can build on the current findings and extend the theoretical and practical relevance of research on FoMO, ESG awareness, and digital consumer loyalty.

8. CONCLUSION

This study provides new insights into the psychological and ethical drivers of repurchase intention in social commerce, particularly among Generation Z consumers. By integrating FoMO and ESG awareness into the Stimulus–Organism–Response (S–O–R) framework, we identify two distinct yet complementary pathways—emotional (via social emotion) and cognitive (via perceived brand value)—through which external stimuli influence consumer behavior.

Our findings highlight that social and promotional FoMO, as well as ESG awareness, significantly shape consumers' internal responses and ultimately drive repurchase decisions. Moreover, brand trust emerges as a key moderating factor that conditions the strength of these relationships.

The study contributes to the academic literature on digital consumer behavior, psychological marketing, and sustainable branding, while offering actionable recommendations for marketers aiming to engage Gen Z in more authentic, emotionally relevant, and ethically grounded ways.

As the digital landscape continues to evolve, future research should build upon this model to explore additional psychological, cultural, and technological factors influencing consumer loyalty in the era of social commerce.

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HIGHER EDUCATION IN FINE ARTS IN VIETNAM TOWARDS SUSTAINABLE DEVELOPMENT – CHALLENGES AND PROSPECTS

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ABSTRACT

Higher education in visual arts plays a key role in promoting the Sustainable Development Goals by integrating art with efforts to address global challenges such as climate change and resource depletion. Research in Vietnam has highlighted limitations in incorporating sustainability principles into the curriculum, while also proposing comprehensive and innovative solutions. The suggested approaches include integrating visual arts with issues like eco-art, material recycling, and community-based art. The impact of art in education is illustrated through practical examples that encourage active participation from both students and lecturers. Ultimately, visual arts are affirmed as an effective and strategic tool for shaping green lifestyles and social responsibility, contributing to a sustainable future rooted in culture and the arts.

Keywords: Eco-art, Higher education, Sustainable Development, Visual arts

1. INTRODUCTION

In an era of deepening globalization, humanity is facing unprecedented challenges, including climate change, the depletion of natural resources, and the growing inequality in society. These issues pose environmental risks, threaten economic stability, and disrupt social balance on a global scale. In this context, higher education is increasingly regarded as a crucial tool for promoting the United Nations' Sustainable Development Goals. Within the higher education system, visual arts education emerges as a distinctive field that helps shape aesthetic values and contributes to building a sense of social responsibility.

Environmental protection is a key pillar of sustainable development and is a matter of great concern for the Party and State of Vietnam. Environmental protection and sustainable development are closely linked; sustainable development requires environmental protection, and vice versa, environmental protection must aim toward the goal of sustainable development.

Visual arts education at the higher education level in Vietnam has achieved notable success in training generations of talented young artists. However, the current curriculum lacks components related to sustainable development, which represents a significant limitation. Courses still primarily focus on traditional artistic techniques and creativity, while aspects such as eco-art, material recycling, and community-based art remain underexplored. This limits students' opportunities to engage with sustainable art initiatives, thereby reducing the effectiveness of visual arts education in addressing pressing environmental and social challenges (Nguyễn Hồng Dương, 2024).

In this context, it is essential to innovate the visual arts curriculum by integrating principles of sustainable development and encouraging the active participation of both lecturers and students. Art is a tool that reflects social realities and serves as a powerful medium for inspiring and transforming perceptions. By incorporating elements such as green art, recycling, and community art into training programs, visual arts education can foster creativity, promote sustainable thinking, and shape environmentally conscious attitudes.

To meet the demand for innovation, this article aims to clarify the current limitations of visual arts education at the university level in Vietnam and propose solutions to fully unlock the potential of this field in contributing to the Sustainable Development Goals. Through comprehensive and practical approaches, it offers a fresh perspective on the role of arts education in shaping values and social responsibility, thereby contributing to a sustainable future (Đỗ Thị Kim Phương, 2024).

2. METHODOLOGY

The article employs both qualitative and quantitative research methods to analyze the current situation and propose solutions for integrating sustainable development principles into visual arts education in Vietnam. Data was collected through a survey of curricula at universities offering visual arts programs, focusing on content related to sustainability such as green art, material recycling, and community-based art. This approach helps assess the challenges and opportunities of incorporating sustainability principles into arts education.

A student survey was conducted to explore their level of interest and participation in activities related to sustainable art. The data from this survey offers an overview of learners' needs and awareness in the current context. To further clarify influencing factors, the study analyzes international documents on arts education and reports on educational models that have deeply integrated sustainability into visual arts teaching.

A comparative method is used to contrast Vietnamese curricula with international models, drawing lessons and evaluating the feasibility of applying these models in Vietnam. In addition, fieldwork is carried out through observation and participation in local community art projects, aiming to clarify the real-world impact of art on society and the environment.

The collected data is analyzed using quantitative tools to identify trends and the level of awareness among students and lecturers. At the same time, qualitative analysis is applied to provide deeper insights from interviews and documents, ensuring a comprehensive and accurate understanding of the current situation and potential solutions.

This mixed-methods approach offers a thorough assessment of visual arts education in Vietnam, providing a solid scientific foundation for innovative solutions toward a sustainable arts education system that meets the demands of the modern era.

3. FINDINGS AND DISCUSSION

3.1. The Current State of Higher Education in Fine Arts in Vietnam

Higher education in fine arts in Vietnam has achieved significant milestones, affirming its role as a core training field that contributes to the development of contemporary cultural and artistic life. In recent years, universities specializing in fine arts—such as the Vietnam University of Fine Arts (VUFA) and Ho Chi Minh City University of Fine Arts—have invested in upgrading facilities, modernizing curricula, and promoting research. For example, between 2018 and 2023, VUFA reported a 25% increase in student enrollment and launched over 10 new elective courses focused on digital art and multimedia (VUFA, 2023).

Despite these improvements, challenges remain. One of the most pressing issues is the insufficient integration of sustainable development principles into academic programs. A national curriculum audit by the Ministry of Education and Training (MOET, 2022) indicated that over 80% of fine arts curricula at public universities still prioritize traditional disciplines such as painting, sculpture, and printmaking, with limited content addressing contemporary global challenges. Course offerings related to art ethics, environmental sustainability, and social engagement remain scarce or are treated as optional seminars rather than core subjects (Nguyen & Tran, 2021).

Furthermore, faculty expertise often reflects a more traditional training background. According to a study by the Vietnam Institute of Culture and Arts Studies, only 12% of fine arts lecturers had received training abroad or participated in international collaborations on sustainable or socially engaged art practices (VICAS, 2021). This lack of international exposure also limits the global outlook and cross-cultural competencies of both teachers and students.

In addition, collaborations with international institutions and participation in global art networks remain limited. While some efforts have been made—such as joint exhibitions with Southeast Asian partners—Vietnamese fine arts education still lacks consistent frameworks for international exchange, research partnerships, or student mobility programs (Le, 2020).

These limitations significantly restrict the capacity of fine arts education in Vietnam to contribute meaningfully to the United Nations' Sustainable Development Goals (SDGs). Without curriculum reform and expanded institutional partnerships, fine arts graduates may lack the interdisciplinary tools and critical perspectives needed to use art as a force for social and environmental transformation (UNESCO, 2019).

A survey conducted at several fine arts universities in Vietnam revealed that 68% of students are aware of the importance of environmental protection and sustainable development, but only 5% have ever participated in related practical activities. Many students expressed a desire to take part in community art projects or sustainability-focused art initiatives, but the lack of opportunities—due to curricula not accommodating these topics—has hindered their involvement. Survey results also showed that only a small number of lecturers had ever organized or participated in educational sessions or hands-on projects related to sustainability.

One key reason for this situation is the shortage of appropriate teaching materials and pedagogical methods. Many lecturers reported that they had not received formal training on how to integrate sustainability elements into art education. Additionally, professional development courses or workshops to enhance teachers' capacity in this area remain very limited. As a result, lecturers often have to develop content on their own, making it challenging to create high-quality, practical lessons.

Furthermore, the facilities at many universities are still inadequately equipped to support teaching and practice related to sustainable development. Research or creative projects on green art, material recycling, or community-based art typically require specialized labs or practice spaces, which many institutions currently lack. The absence of financial and policy support from administrative levels is also a major barrier, making it difficult to implement sustainability initiatives effectively in fine arts education.

Moreover, the lack of collaboration between Vietnamese universities and international organizations has reduced opportunities to learn from and apply advanced sustainable art education models. While countries like Finland, Germany, and Japan have made great strides in incorporating sustainable development into art education through practical projects and multilateral partnerships, Vietnam still faces limitations in accessing and learning from these approaches.

In summary, this situation calls for a comprehensive renewal of curricula, teaching methodologies, and support systems so that fine arts education in Vietnam can fulfill its role in promoting sustainable development and meet the demands of the modern era.

3.2. The Role of Visual Arts Education in Sustainable Development

Visual arts education plays an irreplaceable role in promoting the United Nations' Sustainable Development Goals. With its creative nature and powerful ability to convey messages through visual language, visual arts contribute to preserving cultural values, raising awareness, and inspiring social action on environmental, economic, and social issues. When integrated into sustainable development initiatives, visual arts can become an effective bridge between education, communities, and global challenges. Incorporating green art and related subjects into training programs can help shape students' environmentally responsible attitudes. International studies show that when students participate in sustainable art projects, they develop creative skills and gain a deeper understanding of their responsibilities toward society and the environment. For instance, the "Green Art Lab Alliance" (GALA), a Europe-wide project, has successfully connected artists and art institutions to explore sustainability through workshops, residencies, and exhibitions across countries including the Netherlands, Spain, and the UK. In Vietnam, visual arts education holds great potential to build a sustainability-minded young generation—if these contents are integrated systematically and scientifically.

Raising Awareness and Shaping Green Lifestyles: Visual arts have a unique ability to raise awareness about environmental issues and social responsibility. Artworks made from recycled materials, addressing climate change, or reflecting natural resource degradation can attract public attention and evoke empathy, thereby encouraging environmental protection. For example, eco-art has become an effective means of educating communities about waste reduction, sustainable resource use, and nature conservation. (Figure 1)

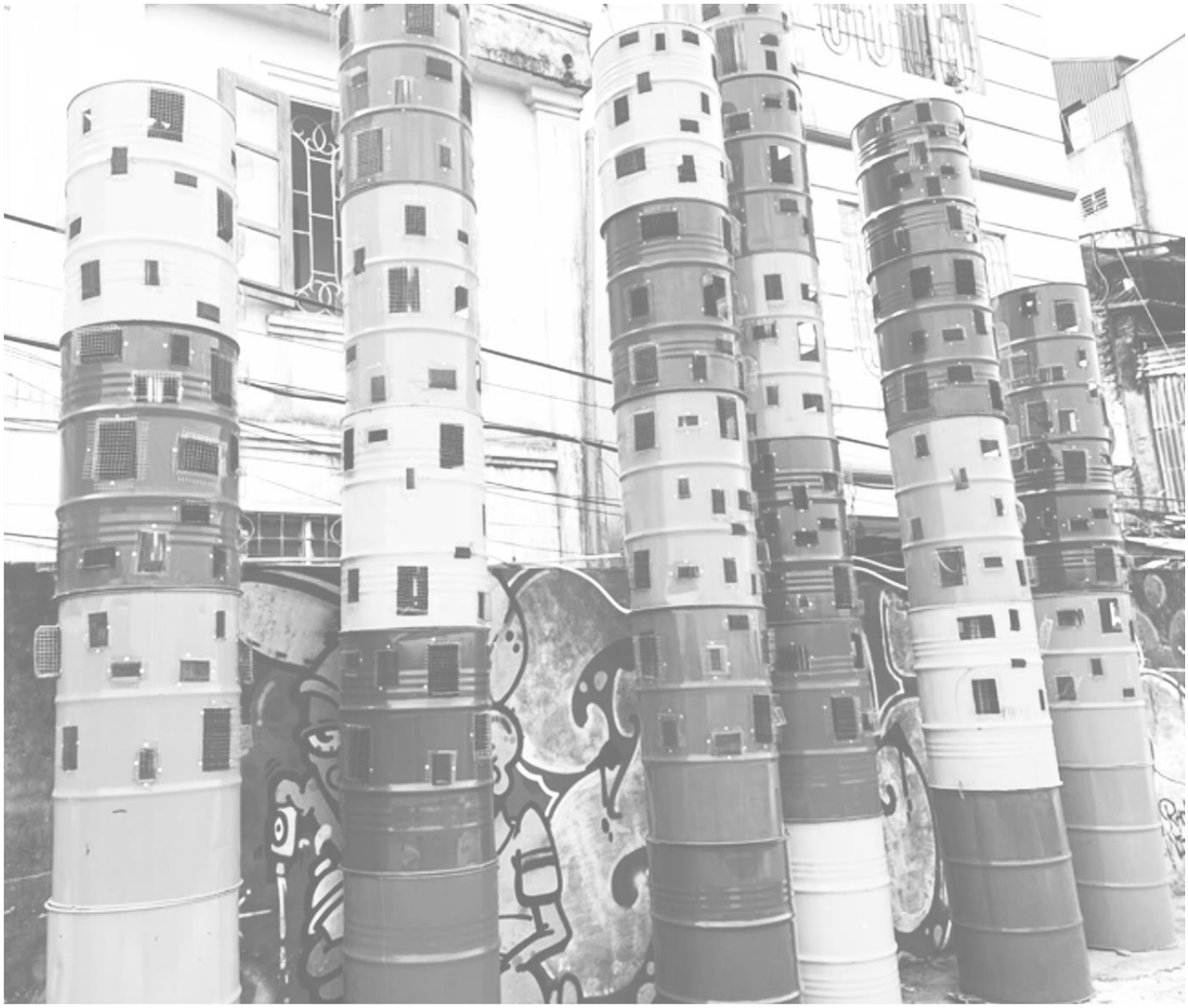


Figure 1: The artwork "Riverside City" by sculptor Nguyễn Ngọc Lâm uses old, colorful barrels.

Source: The author

Promoting community engagement and addressing social issues: Visual arts also have the potential to connect communities and encourage participation in social activities. Public art and community art projects not only beautify living spaces but also create platforms for people to come together to discuss and address issues such as gender equality, poverty reduction, and cultural heritage preservation. These initiatives help raise community awareness of their role in building a sustainable and united society. International models such as Aalto University (Finland) have embedded sustainable development into their visual arts and design programs by combining interdisciplinary approaches with real-world projects on social innovation and climate solutions.

Fostering creativity and innovation: Visual arts education is not only a place to develop technical skills but also an ideal environment to stimulate creative and innovative thinking. In the context of sustainable development, creativity goes beyond creating visually appealing artworks to include solving practical problems such as material recycling, sustainable design, and minimizing environmental impact. Notably, the integration of artificial intelligence (AI) in visual arts education is gaining attention. Creative labs at universities around the world have demonstrated that when students are given the opportunity to experiment with new ideas, they can develop breakthrough solutions that contribute to solving global issues (Zang & Aslan, 2021).

Contributing to the preservation and promotion of cultural heritage: Beyond promoting sustainability, visual arts also help preserve traditional cultural values, especially in the context of globalization. Through artworks that reflect national identity, students can learn to connect traditional values with sustainable principles, thereby creating works that

are both unique and highly educational. This contributes to preserving cultural heritage and helps build a national cultural brand on the international stage (Lê Văn Sửu, 2013).

In Vietnam, community art projects have begun to be implemented in some localities, but they remain spontaneous and have not yet been fully integrated into visual arts education programs. If organized systematically, these activities could become a crucial part of promoting social values and enhancing the practical application of art in everyday life.

3.3. Solutions to Promote Sustainable Development in Visual Arts Education

In order for visual arts education in Vietnam to meet the demands of sustainable development and play a positive role in achieving the Sustainable Development Goals (SDGs), a comprehensive set of solutions needs to be implemented. These solutions focus on curriculum reform, fostering creativity, enhancing teaching capacity, and building international cooperation. Below are specific recommendations:

Firstly, the curriculum should be adjusted to integrate subjects related to sustainable development in order to meet the needs of modern society and address global challenges (Le, H. V., & Nguyen, C. H., 2023). The visual arts education program needs to undergo a comprehensive reform, emphasizing the integration of sustainability-related content. This helps raise students' awareness of the role of art in addressing global issues and encourages them to engage in initiatives that promote social change. Courses such as *Green Art* and *Community Art* should be incorporated as essential components of the curriculum.

Green Art can focus on the use of recycled or sustainable materials in the artistic creation process. For instance, students can learn how to make use of plastic waste, recycled paper, or natural materials to create artworks that convey environmental protection messages. This subject develops creative skills, promotes resource conservation awareness, and encourages waste reduction, contributing to the formation of an eco-conscious lifestyle (Lê Thị Thu Hà, 2024).

Recycling and Design provides students with the knowledge and skills to reuse materials in the design of artistic products, thereby exploring new and innovative ways to create works that are both unique and environmentally friendly. (Figure 2)

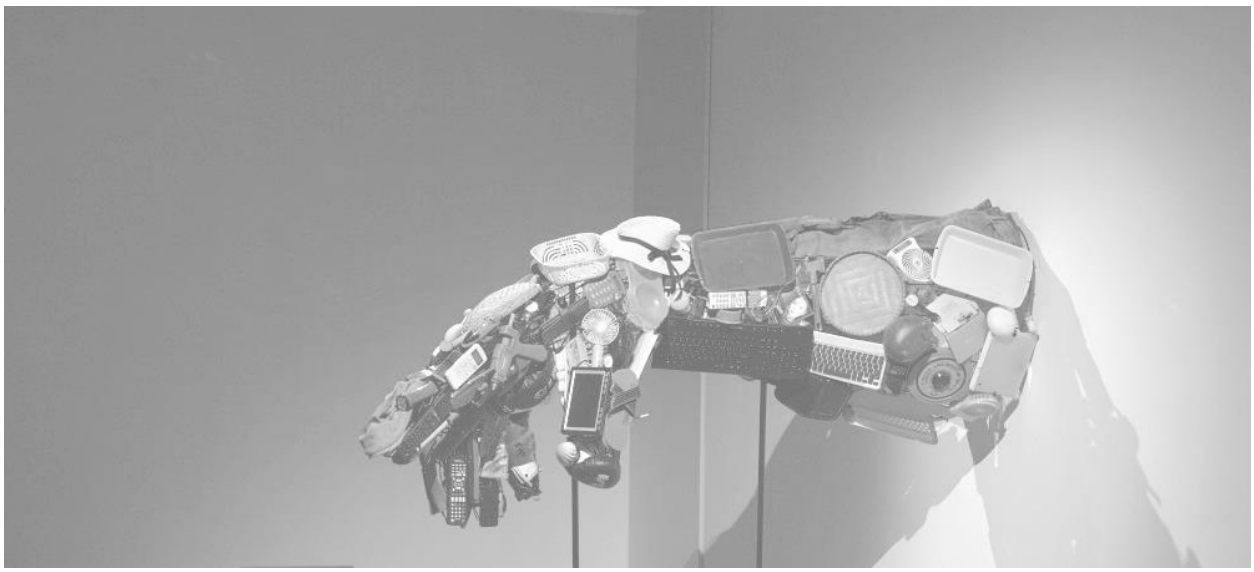


Figure 2: The artwork "Creation" at the exhibition "New Life in Old Spaces" is created from recycled materials that have been previously used.

Source: The Author

"Community Art" aims to connect art with social groups through collaborative projects, exhibitions, or community activities. These projects help students better understand the role of art in building solidarity and addressing social issues such as equality, education, and poverty reduction.

These courses should be designed flexibly to suit the characteristics of each institution and student group. At the same time, workshops and forums with the participation of experts in sustainable development should be organized to broaden students' perspectives and inspire creativity.

In addition to integrating these courses into the curriculum, training programs should include practical projects to help students apply their knowledge, develop teamwork and problem-solving skills, and understand how to apply art in specific contexts. These practical projects should be designed to closely link art and sustainable development, encouraging students to participate in community art initiatives or projects such as Video Art Practice (Lê Trần Hậu Anh, 2013).

For example, within the framework of a course like "Green Art", students could be required to design and implement an exhibition with an environmental protection theme. The exhibition would feature artworks made from recycled materials and incorporate interactive activities, such as recycling workshops, presentations on waste reduction, and discussions with the local community. These activities not only enhance students' artistic skills but also create opportunities for them to positively influence public awareness. The effectiveness of such exhibitions can be assessed through participant feedback forms, attendance rates, and pre- and post-event surveys that measure changes in public attitudes toward sustainability issues.

Similarly, in a course like "Community Art", students could take part in projects such as painting murals in public spaces, creating art installations from natural materials in local areas, or organizing art exchanges at schools or cultural centers. These projects foster students' social awareness and affirm the role of art as a powerful tool to promote positive social change. Practical projects should be supervised by experienced faculty and encourage the involvement of external experts to provide students with diverse and practical perspectives. Furthermore, these projects should be evaluated based on their artistic quality as well as their social and environmental impact. To evaluate the impact of these community-based initiatives, programs should adopt a set of measurable indicators such as student reflections, project documentation, community engagement levels, and long-term follow-up on how the artworks have been maintained or received by local residents. Additionally, institutions can develop internal monitoring frameworks using tools such as course evaluations, alumni surveys, and peer reviews to regularly assess the relevance and outcomes of sustainability-focused courses.

For these courses and projects to be effectively implemented, universities must support infrastructure, funding, and educational resources. There should also be policies to encourage faculty and students to engage in sustainable art initiatives, such as scholarships or financial support for high-impact social projects.

Secondly, fine arts education must create a learning environment that encourages innovation and creativity—where students are inspired to explore new ideas and seek solutions to sustainability challenges. Universities should establish creative labs or specialized practice spaces equipped with necessary tools and resources for students to experiment with innovative art ideas. These labs should focus on topics such as material recycling, environmentally friendly product design, and community art. For instance, students could use recycled materials to create art pieces or carry out experimental projects like designing sustainable public spaces. These spaces also support technical skills and promote teamwork, problem-solving, and learning from industry professionals (Đinh Thị Mỹ Hạnh, 2021).

One key factor in developing innovation capacity is encouraging students and faculty to participate in research projects related to art and sustainable development. In recycling and green art projects, students might research how to use recycled materials to create new artworks, thereby raising environmental awareness in the community. The application of technology in art—such as combining art with advanced technologies like 3D printing or digital tools—can help generate creative products while minimizing environmental impact.

These research projects help students develop professional skills and deepen their understanding of the relationship between art and social, economic, and environmental issues. They can also be organized as interdisciplinary projects, combining fields such as engineering, architecture, or environmental science to broaden the applications of art. Developing creativity is not only a task for students but also requires innovation in teaching methods. Universities should provide training and workshops for faculty on new pedagogical approaches that foster creativity and integrate sustainable development content into teaching. Moreover, instructors should apply active learning methods such as project-based learning or inquiry-based learning, encouraging students to engage actively and seek practical solutions to real-world problems. For example, in a "Green Art" course, the instructor might ask students to design an art exhibition using recycled materials, thereby fostering both learning and social impact.

An important way to promote innovation is to facilitate participation of students and faculty in idea-sharing forums or international conferences on art and sustainable development. Through these activities, students can learn from leading

models, access the latest trends in the field, and expand their understanding of the role of art in solving global issues. Additionally, collaborating with NGOs and local communities on practical art projects is also an effective way for students to develop creative thinking and a deeper awareness of their social responsibilities. Universities should support and encourage student creativity through awards, scholarships, or funding for sustainable art projects. These recognitions motivate creative spirit and inspire students to continue developing innovative ideas in the future (Đặng Thị Phong Lan, 2023).

Thirdly, enhancing teaching capacity is essential. One of the current major limitations in fine arts education in Vietnam is that many instructors lack the knowledge and skills to integrate sustainability elements into their teaching. To address this, universities should organize in-depth training courses for faculty focused on understanding sustainable development. Faculty must grasp key sustainability principles, environmental issues, and how to connect these concepts to art education. In addition, new teaching methods must be introduced, offering knowledge on modern pedagogy such as project-based learning and experiential learning, so instructors can deliver content in engaging and effective ways. These trainings can take the form of short-term workshops, long-term programs, or online courses—providing flexible access regardless of location. Furthermore, universities should invite domestic and international experts in art and sustainability to teach and share their experiences.

A vital aspect of improving teaching capacity is providing faculty with appropriate resources and teaching materials. Universities should develop or collect materials related to green art, material recycling, community art, and other sustainability-related content. These resources should combine theory with practical examples and detailed guidelines to support implementation in teaching. In addition, open-access databases on art and sustainable development should be created to allow students and teachers to access and utilize them in learning and teaching. These databases should be updated regularly with research, academic articles, and materials from universities and international organizations.

Improving teaching capacity relies not only on individual training but also on collaboration and knowledge sharing among instructors. Universities should organize professional forums where instructors can discuss, share ideas, and learn from each other. Regular workshops within the institution should be held for faculty to share experiences in teaching and integrating sustainability content. It is also important to connect art educators across institutions—both nationally and internationally—to exchange teaching methods and build collaborative training programs. Establishing a network of educators specializing in art and sustainable development will enhance collaboration and promote knowledge sharing among institutions. To support faculty in effectively implementing sustainable development content, universities must invest in infrastructure and technology. Classrooms should be equipped with modern tools such as 3D printers, recycled materials, and other creative resources, enabling instructors to apply advanced teaching methods. Universities should also encourage faculty to participate in real-life projects or research related to sustainable development, gaining practical experience to enrich student learning (Guo, 2022).

A key factor in improving teaching capacity is creating motivation for instructors. Universities should establish reward and recognition programs for outstanding contributions in teaching and research on sustainability. For example, instructors could be awarded prizes, receive financial support for creative teaching projects, or be recognized at academic conferences. Policies such as reducing administrative workloads or increasing funding for research projects can help faculty focus on developing high-quality teaching content.

Fourthly, international collaboration is a crucial strategy for enhancing the quality of fine arts education in Vietnam, particularly in integrating sustainability into the curriculum. Universities should establish partnerships with institutions and organizations that are leading in this field, such as those in Finland, Germany, and Japan. These collaborations can include student and faculty exchanges, co-development of joint art projects, and organizing international exhibitions. For example, exchange programs can broaden perspectives, create opportunities for learning from experience, and foster the sharing of unique artistic values between cultures. In addition, hosting international exhibitions on themes such as green art, resource conservation, and waste reduction promotes creativity and raises global awareness about the role of art in sustainable development.

Moreover, universities should proactively participate in international art projects related to sustainable development, such as designing sustainable public spaces or creating artworks from recycled materials. Joining global art networks like

the UNESCO Creative Cities Network or the International Art Education Association enables access to funding, learning from successful models, and promoting the internationalization of Vietnam's fine arts education.

Fifthly, the role of art goes beyond aesthetics—it also has the potential to connect communities and address social issues. To fully harness this potential, universities should proactively organize community art projects, giving students opportunities to apply knowledge in practice and strengthen the connection between art and daily life. These projects could focus on themes such as environmental protection, gender equality, or cultural heritage preservation. For instance, students and faculty might collaborate with local authorities to create recycled-material art installations in parks, schools, or other public spaces. These works not only add aesthetic value but also raise community awareness about environmental protection and sustainable development.

In addition, community-connected art programs should be implemented systematically and over the long term. Incorporating community art modules into academic programs allows students to directly engage in practice-based activities and better understand the roles and responsibilities of art in society. These programs could include traveling exhibitions in rural, industrial, or border areas, combined with educational and cultural exchange activities to spread the value of art within communities. To further engage the public in art education, universities could also organize open classes or art workshops. These activities help the community engage more deeply with art, creating opportunities for students and faculty to interact with and learn from local people—thereby enriching the creative experience.

4. CONCLUSION

Higher education in fine arts in Vietnam plays an important role in promoting the United Nations' Sustainable Development Goals. However, the current situation reveals several limitations regarding the curriculum, faculty capacity, and international connections. This calls for an urgent need for comprehensive reform to maximize the potential of this field. The paper clarifies the current limitations and challenges while proposing strategic solutions. Integrating content such as green art, recycling, and community art into the curriculum not only raises students' awareness of sustainable development but also encourages creativity, critical thinking, and social responsibility. At the same time, enhancing teaching capacity through training courses, specialized materials, and modern infrastructure is key to ensuring the effectiveness of improvements. International cooperation is also emphasized as a strategic element for learning from advanced models, expanding networks, and elevating the status of Vietnamese fine arts on the global stage. Finally, the role of art in the community should be strengthened through practical projects, creating opportunities to connect art with everyday life and spreading cultural values and social responsibility.

In conclusion, fine arts education is a creative field that drives social awareness, heritage preservation, and addresses global challenges. Implementing the solutions proposed in this paper will improve the quality of education and affirm the strategic role of art in building a sustainable future.

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THE SOCIAL CARRYING CAPACITY OF A MOUNTAINOUS TOURIST AREA: THE CASE OF FANSIPAN, SAPA IN VIETNAM

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ABSTRACT

Fansipan is the highest mountain in Vietnam and also the place where snow falls in Vietnam. Fansipan tourism is not only famous for mountain climbing activities but also the best place for ecotourism development. In 2016, Fansipan opened a recreation area with the second longest cable car, helping the tourism economy in Sa Pa, Lao Cai, develop rapidly. Fansipan (Sa Pa) is now facing the problem of finding a direction for sustainable tourism development. This article mainly focuses on the concept of Social Carrying Capacity (SCC) and the Limit of Acceptable Change (LAC) of tourists through visual display images. The research results help to provide more intuitive results for the development and management of Fansipan in the future.

Key words: Fansipan, limit of acceptable change, social carrying capacity, sustainable ecotourism.

1. INTRODUCTION

Global tourism development and Vietnam in particular also bring environmental and carrying capacity concerns. Overtourism, or excessive tourism, negatively impacts global destinations by straining infrastructure, damaging the environment, and disrupting local communities. Literature shows that many scholars and researchers have common concerns about the direct impacts of tourism development on environmental and socio-economic issues. Arrow et al. (1995) highlight that economic activities can only be sustainable if the ecosystem supporting them are capable of recovery. In other words, tourism and ecosystems can only develop sustainably when the tourism economy genuinely supports and protects the ecosystems it relies on (Zhang & Deng, 2024). As tourism grows and destinations become more popular, tourist flow increased pressure on the environment and local resources may lead to negative impacts and raise sustainability concerns (Ismail et al., 2015).

Recently, construction and urbanization in Vietnam have a complex and often challenging relationship with sustainable tourism. While they can bring economic benefits and improved infrastructure, they also pose significant threats to the long-term sustainability of the tourism sector. In 2016, Sun Group and the leaders of Lao Cai Provincial People's Committee and Sa Pa District decided to put into operation the Sun World Fansipan Legend tourist recreation area, providing mountain train and mountain cable car services. Then, many controversial debates have gone on about the economic benefits and conservation of cultural-natural heritage in tourism development at Fansipan. (Người Đô Thị, 2016). The daily lives of residents have seen various improvements, and new infrastructure has been rapidly developed. However, the growth of tourism has also caused many negative impacts, particularly on the ecosystem of the Hoang Lien Son Mountain range in Vietnam. Since 2018, Fansipan is now not only a well-known ecotourism destination for hiking tourists but also a recreational and spiritual site for mass tourists. One of the most prominent effects observed was a significant increase in tourist arrivals due to advertising and new services. Known as the second-longest cable car in Vietnam (after the one in Hon Thom, Phu Quoc), it allows mass tourists to reach the peak of Fansipan (the highest in Indochina region) and replaces the traditional trekking approach. This paper aims to explore tourists' perceptions of overcrowding and their acceptance of carrying capacity from their own perspective. The study focuses on answering the question, how do tourists actually perceive the current situation at this destination before and after the change process due to tourism development?

2. LITERATURE REVIEW

2.1. Social carrying capacity (SCC)

In academic literature, capacity has many dimensions and can be described in many different ways. Carrying capacity is psychological and social culture-carrying capacity and ecological carrying capacity (Zelenka & Kacetl, 2014; Jangra & Kaushik, 2021). Stokols (1972) distinguishes between the definitions of density and crowding. Density is the physical condition of limited space, while crowding is the psychological experience, a person's perception of the experience. According to his definition, crowding is a phenomenon closely related to social problems. The human aspect of crowding suggests some hypotheses that the limitation of space or place limits individual or social activities. Carrying capacity relative to the definition of Limits of Acceptable Change (LAC) (Stankey et al., 1985; Kennell, 2014; Zelena & Kacetl, 2014). Stankey and his authors initiated the Limits of Acceptable Change (LAC) process in the mid-20th century. They presented nine steps explaining the process of deciding what types of wilderness conditions are acceptable and how to achieve them. Most important in their findings were the ideas of limits of use and how to describe acceptance criteria (Stankey et al., 1985).

There are several types of carrying capacity, which have been investigated in various fields such as: social, physical, environmental (ecological), psychological and economic. The definition of carrying capacity has different versions depending on the type of tourism and destination, which is vital for sustainable tourism development, especially in culturally or ecologically sensitive areas. This concept refers to the maximum number of visitors that a destination can accommodate without causing unacceptable alterations to the environment, local community, or visitor experience. In a basic perspective context, carrying capacity is a concept that was of limited utility in the period (Kennell, 2014; Wall, 2020; López-Bonilla & López-Bonilla, 2018).

Unlike traditional carrying capacity, which focuses on maximum numbers, LAC emphasizes the conditions of the site and what level of change is acceptable to stakeholders, especially in sensitive natural or cultural environments. The notion of LAC has been discussed in some prestige journal articles as it is a critical concept in tourism research and management, providing a framework for managing visitor impacts rather than simply restricting visitor numbers. Komsary et al. (2018) have researched LAC and found out the limits of acceptable change indicators at Pangandaran. They defined LAC as a managerial tool in providing a framework for the management to diversify the recreational experience, it also as a framework intended to limit the physical development on a massive scale. Mc Cool (2012) confirmed that LAC is not a process to establish a tourism carrying capacity. It is a process to help managers think through the complex challenges of integrating two often conflicting and providing access to protected areas. In particular, LAC explicitly focuses on what conditions—e.g., visitor experiences. Said et al. (2013) demonstrated that a deficiency of service quality of the park such as pertaining to environmental safety/security can potentially enhance visitors' experience and satisfaction. According to Xiao et al. (2023), the social capacity of parks and recreation areas is related to many factors.

The most important factor is visitor motivation, which plays a role in individual perceptions of crowding and satisfaction. Service quality affects visitor perceptions (Hamilton et al., 1991) and satisfaction (Graefe & Burns, 2013). Hamilton and his authors work with customer service quality ideas. They studied Parasuraman's SERVQUAL with five dimensions: tangibles, reliability, responsiveness, assurance, and empathy. Five dimensions can directly affect visitor satisfaction. Tangibles represent physical facilities such as equipment. Reliability refers to the ability to perform the promised service dependably and accurately. Responsiveness is the willingness to help users and provide prompt attention. Assurance refers to courteous and knowledgeable employees who convey trust and confidence. Empathy involves providing caring (Hamilton et al., 1991).

2.2. Over-tourism and crowding phenomenon

Carrying capacity is one of the earliest attempts to define the limits of overtourism and to find ways to manage waste and overcrowding in tourism (Kennell, 2014). Controlling external impacts on destinations and carrying capacity is also a way to protect areas (Zelenka & Kacetl, 2014). Ismail et al. (2015) found that overcrowding has a negative impact on the tourist experience, especially safety. Overcrowding contributes negatively to safety issues, and increased tourist numbers reduce the tourist experience. Wall (2020) that carrying capacity is a concept that has gained much attention and is a precursor to current concerns about over-tourism, emphasizing that the number of tourists and their behavior can overload the places they visit, damaging both tourism resources and the lifestyles of those living in the destination areas.

Social carrying capacity can be influenced by the characteristics of encounters, including the similarity of activities, the behavior of encounters, and the group size of encounters (Xiao et al., 2023).

The crowding phenomenon is a crucial issue in tourism research because it directly affects visitor experience, destination sustainability, and the well-being of local communities. It refers to the perception or reality of having too many people in a given space, leading to negative social, environmental, and economic impacts. This phenomenon, according to Montano and Adamopoulos (1984) found that some important factors in the behavioral mode of the crowding phenomenon are Psychological Withdrawal, Immediate Physical Withdrawal and Adaptation. Psychological Withdrawal behavior is those behaviors characterized by psychological expression in the form of silence, ignoring others or doing something by oneself. While Immediate Physical Withdrawal is the behavioral response to high crowding load, the individual leaves as quickly as possible in the actual situation. Graefe and Burns (2013) confirmed that leisure opportunities without overload contributed significantly to explaining satisfaction. Increasing the number of encounters will reduce the level of acceptance of use and positive emotions of tourists.

2.3. Estimate Carrying Capacity (SCC)

Considering carrying capacity, or more broadly, the limits of tourism development, has significant predictive potential (Zelenka & Kacetl, 2014). There are many ways to measure the SCC. The indicator and standard of quality framework analyzes the levels of crowding and identifies the minimum acceptable conditions of indicators for visitor use or uses a Visual Simulation Survey of People Per View (Xiao et al., 2023). The level of tourist use is going to be measured using the temporary concentration of visitors in a tourist destination. The tourist season could be used to estimate the impact of tourists' satisfaction with tangible services (bus, restaurant, urban surroundings) or intangible (scenery of destination, value of the money) (López-Bonilla & López-Bonilla, 2008).

Jangra and Kaushik (2021) in their study applied three-level procedures to estimate physical, actual, and effective carrying capacity with seven correction factors (Cf) and ten management capacities (Mc). It is important to identify tourism impacts of various types and assess carrying capacity to address the negative impacts in the system. They estimated Carrying Capacity in a High Mountainous Tourist Area with some formulas:

Real Carrying Capacity = Physical Carrying Capacity (PCC) x Correction Factors.

In that regard, PCC is defined as a specific space which is calculated as:

PCC = Area available for tourism (m2) x Appropriate space for the displacement of tourists/tourist density (tourists/m2) x Rotation factor (number of visits per day).

While in the literature, previous publication explained the PCC of Sa Pa mountain as:

$$\mathrm{PCC} = \frac{A}{V} \times T = \frac{20,000}{4} \times 4 = 5,000 \times 4 = 20,000 \text{ (visitors/day)}$$

Correction Factors = Limiting magnitude of the variable/ Total magnitude of variable x 100.

Correction Factors could be a valuation of the potential factors that affect tourism numbers or limit touristic activities is essential. Truong Sy Vinh (2019) successfully applied these formulas to estimate the carrying capacity of ecosystems and the environment and the carrying capacity of socio-economic infrastructures such as water supply systems, waste treatment systems, and transportation. For safe movement on trails and view areas, a common standard is 4 m² per person. Then, it has been suggested by literature that future research should combine PCC with LAC and stakeholder interviews to identify how many tourists Sa Pa can truly sustain without degrading culture, ecology, or visitor experience.

2.4. The importance of reducing over-tourism and sustainable development

According to Sustainable Travel International (2024), overtourism occurs when too many visitors flock to a destination and leading to negative impacts such as overcrowding (Kaitlyn Brajcich, 2025). Dodds and Butler (2019) define overtourism as a situation where the number of tourists is too high, causing negative impacts on the economy, the nature of the destination, and the tourist experience. Overtourism can be influenced by media promotion and needs to be politically controlled. Kim and Yoon (2020) argue that crowded destinations are an important issue in sustainable tourism. By understanding tourists' perception of crowding to develop a sustainable tourism industry. Their study found that tourists' perceptions of crowded destinations influenced tourists' behavior and drew their attention to calls for responsible

travel behavior and sustainable tourism. Destination organizations can engage tourists at popular destinations to promote sustainable travel behavior. Jin et al. (2016) studied the relationship between tourists' perceived crowding and sustainable tourism destination management, revealing that: (1) crowding causes damage and waste to natural, socio-cultural, and financial resources; (2) crowding puts pressure on the destination such as noise and conflict; (3) crowding has negative impacts on the long-term development of tourism. Meanwhile, the paper also suggests some resolutions to control crowding by educating tourism staff and managing specific popular areas. VietnamNet magazine criticizes that overtourism has become a pressing concern in Vietnam as the country's tourism sector experiences rapid growth. In 2024, this destination welcomed approximately 17.5 million international visitors and 110 million domestic travelers, nearing pre-pandemic levels. While this surge has bolstered the economy, it has also led to significant challenges in several key destinations.

3. METHODOLOGY

3.1. About the research location

Known as the "Roof of Indochina", Fansipan is the 3147m peak in the Hoang Lien Son range, witnesses a dramatical growth in both domestic and international tourists, as well as transformation of the natural and cultural landscape, since the Sun World Fansipan Legend project inaugurated in 2016. Sun Group built a large tourism complex at the base of the mountain in Sa Pa and another at the summit, including: the longest cable-car line in Vietnam, plazas, commercial zones, hotels, shops, and restaurants, parking lots and transport hubs, etc. In recent years, particularly after Covid-19, millions of visitors annually have overwhelmed the town's infrastructure, leading to congestion, pollution, and waste management issues. Moreover, the mountain peak and surrounding zones have been visually and ecologically transformed from natural highland terrain to a human-modified tourist landscape. Increasing visitor numbers have led to trail degradation, litter, and pressure on the fragile alpine ecosystem of Hoang Lien Son National Park. Therefore, this attraction is a compelling and relevant case study for overtourism, which encapsulates the tension between tourism development, sustainability, and cultural integrity, making it ideal for qualitative, quantitative, and policy-oriented tourism research.

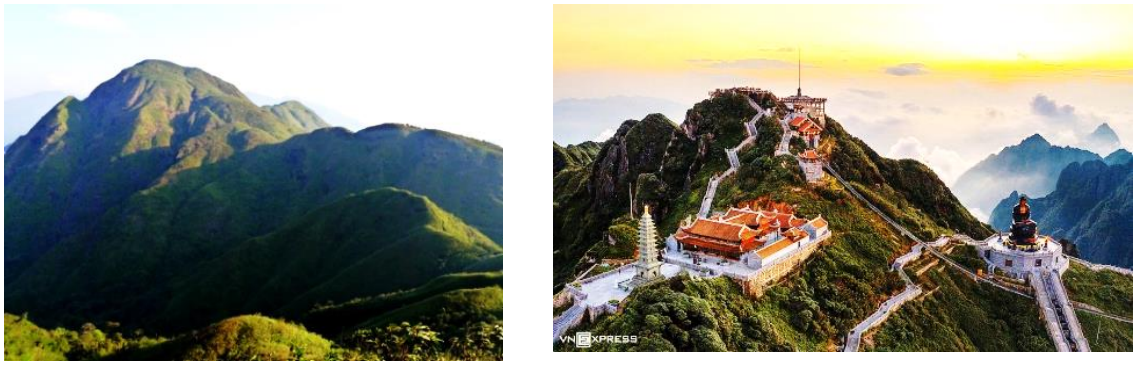


Figure 1-2: The landscape of Fansipan peak in 2012 compared with 2024

Source: https://laocaitourism.vn/

Culturally, Fansipan is deeply significant to the indigenous ethnic minority groups, such as the Hmong and Dao, who inhabit its slopes. For generations, these communities have lived in harmony with the mountain, relying on its resources and incorporating its landscapes into their traditional practices, beliefs, and folklore. The development of modern tourism infrastructure and the influx of visitors present a challenge to preserving their unique cultural identity and traditional way of life, requiring careful management to avoid cultural commodification and loss. Ecologically, it boasts an incredibly diverse and often endemic ecosystem within the Hoang Lien Son mountain range, a biodiversity hotspot. Its varied altitudes create distinct climatic zones, supporting a wide array of flora and fauna, including rare and endangered species (Fasipan fir). The delicate balance of these ecosystems makes it highly susceptible to environmental degradation from human activity.

3.2. Data collection

This study adopts a quantitative approach by conducting a questionnaire-based survey composed of two steps.

In the first step, the questionnaire will be conducted in a pilot test to present a wide-ranging number of visitors. The

Questionnaire consists of two parts: The first section focuses on the socio-demographic characteristics of the respondents, including gender, education level, income, and other relevant factors. The second section explores visitors' normative standards regarding different types of parks and recreational areas to assess their perceptions of crowding. Respondents were also asked to evaluate groups of images, each representing (1) different levels of visitor use, and to indicate which (2) scenarios they found satisfactory or acceptable. Respondents rated the acceptability of each photograph on a scale of -4 (very unacceptable) to +4 (very acceptable). Digitally altered images simulating various visitor density scenarios have been widely applied in the management of social carrying capacity in parks and recreational areas. As noted by Gray and Rumpe (2015), digitalization aims to establish a clear connection between the services provided by organizations and the actual needs of their customers. The digitalization images that visually simulate visitor use scenarios have been widely used in managing social carrying capacity in parks and recreation areas. Manning (2002) used the number of people at one time (PAOT) to standards of quality were set for all zones, and find out the standard of quality of 30 PAOT at Delicate Arch.

Demographics	Categories	Frequency	Percent
1. Gender	Male	16	21.6
	Female	58	78.4
2. Educational background	High school	2	2.7
	University	59	79.7
	Post-graduate	13	17.6
3. Age	1981-1996 Millennials	17	23
	1997-2012 Generation Z	57	77
4. Marital status	Single	68	91.9
	Married	6	8.1
5. Income	<5.000.000	45	60.8
	5.000.001- 9.000.000	12	16.2
	9.000.001 - 19.000.000	12	16.2
	>19.000.001	5	6.8
6. Travel types	Hiking	8	10.8
	Train and Cable car	13	17.6
	Only Cable car	53	71.6
7. Season of visit	Spring	29	39.2
	Summer	16	21.6
	Autumn	15	20.3
	Winter	14	18.9

Table 1. Report of respondents' demographics

In the second step, the study will use the PAOT quality assessment criteria at Fansipan to further measure a large number of tourists' satisfaction with the impact of their cognition. Most of the questionnaires were distributed and completed online. According to Jesús Manuel López-Bonilla & Luis Miguel López-Bonilla (2008) use Tourist Ratios per 100 Residents to measure Visitors and non-visitors' perception about Crowding. I apply 3 questions from 4 groups of the Hierarchical Coping Model of Kuentzel and Heberlein (Kuentzel & Heberlein,1992): (1) the maximum number of people you expect to meet at Fansipan while traveling; (2) the maximum number of people you can adapt continuing to travel to Fansipan. (3) the maximum number of people who will make visitors stop traveling to Fansipan.

This study was conducted in the pilot phase with a sample size of 74, simply describes the characteristics of tourists to the Fansipan tourist destination. Demographics of respondents reported in details as below:

Through descriptive research, the study found that (1) most tourists are female 78.4%; (2) the target group of tourists who have the ability to access nature and high mountains are often young, healthy and single tourists 91.9%, university students 79.7%; (3) Therefore, the average income is relatively low from 5,000,000 to 9,000,000 is 77%; (4) because of the relatively not too difficult to access to Fansipan cable car (mean=2.24, SD=0.138), most tourists choose to use the cable car to go to the top of the mountain 71.6%; (5) The favorite tourist season at Fansipan is spring 38.2%; (6) Most tourists feel that places in Fansipan are often crowded with tourists (mean=1.84, SD=0.114).

Questions	Answers	Frequency	Percent
8. Revisitation	Yes	49	66.2%
	No	25	33.8%
9. Travel history to Fansipan	1 times	37	75.5%
	2 times	8	16.3%
	Up to 3 times	4	0.08%
10. Perception of crowded destination	Very crowded with tourists	16	32.6%
	Moderately crowded	29	67.32%
	Not too crowded with tourists	4	0.08%
11. Perception of quality of transportation to the top of Fansipan	Very convenient, easy to access	37	75.5%
	Normal, adequate	6	12.2%
	Completely inconvenient, not easy to access	6	12.3%

Table 2. Respondent's perceptions of Fansipan destination quality

Perceived Crowding	Range	Min	Max	Mean	Std. Deviation
Visitors'Perception					
Expectation	90	10	100	41.14	25.202
Adaption	91	9	100	64.10	26.959
Withdraw behavior	100	0	100	85.69	28.293
Non-Visitors' Perception					
Expectation	51	5	56	25.92	15.644
Adaption	79	10	89	43.28	22.473
Withdraw behavior	98	2	100	63.44	34.692

Table 3. Perception and Behavioral Adaptations to Perceived Crowding

The table 3 provides summary of tourists' emotional responses and perceptual feelings toward Fansipan Mountain, based on various psychological and affective dimensions. Positive emotions dominate indicates that despite crowding and commercialization, emotional satisfaction remains high for most visitors. Tourists report high agreement with statements like: "Fansipan is a beautiful and impressive destination"; "I feel happy and excited about this trip"; "I feel satisfied after visiting Fansipan peak". It suggests that aesthetic appeal and the "bucket list" nature of Fansipan overshadow minor frustrations. On the other hand, strong sense of pride and achievement aligns with the iconic status of Fansipan and reflects its emotional power as a national and symbolic destination. Many respondents likely agree with sentiments such as: "I feel proud to have visited the highest point in Indochina" and "I feel a sense of achievement or personal growth after this trip". By statements like "I felt overwhelmed by the number of tourists" or "The place felt commercialized", tourists may tolerate crowding as a "necessary cost" of visiting such a famous site. These likely received more neutral or varied responses, suggesting ambivalence.

* Representative photographs of visitor evaluations of 6 photographs showing perception of crowding explains the relationship between the number of people (crowding levels) and visitor acceptability ratings at Fansipan as follows:

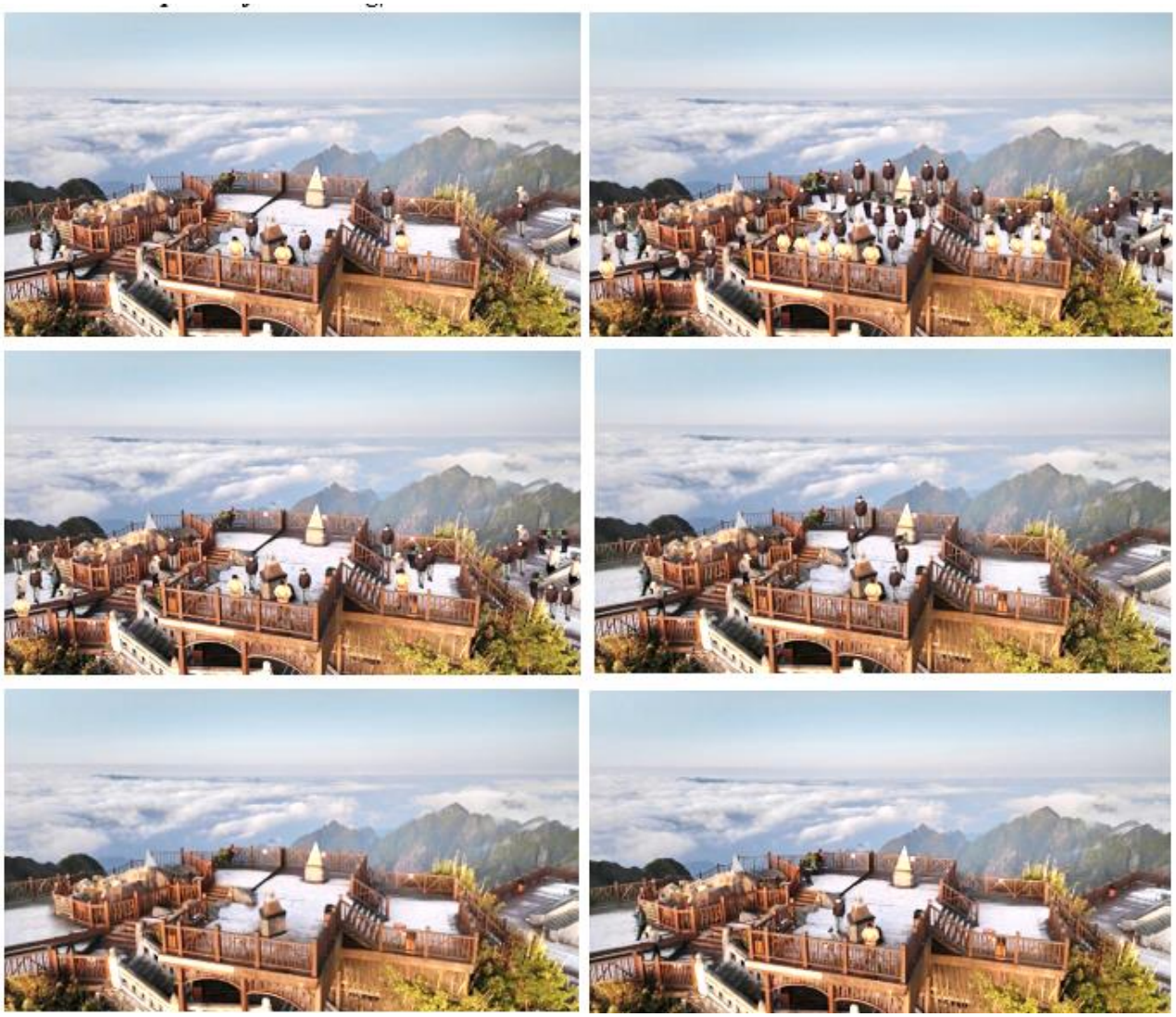


Figure 3. Visual Perception of Crowding

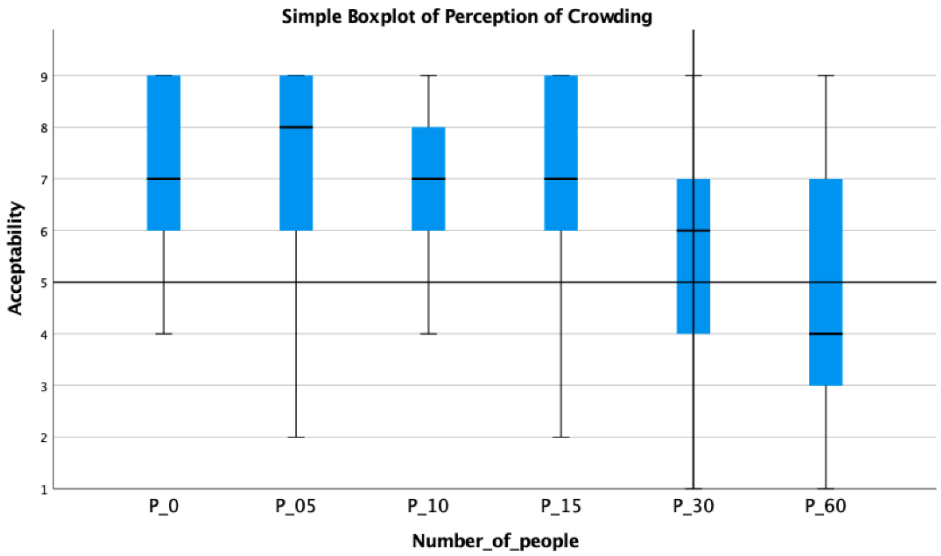


Figure 4. Visitor Evaluations of 6 Photographs Showing Perception of Crowding

This boxplot illustrates tourists' perception of crowding at Fansipan Mountain across varying levels of visitor density and offers a clear visual insight into how tourists' perceptions of crowding shift as the number of people increases. When the number of people is low (P_0 to P_15), acceptability scores remain consistently high, with median values above 7

and narrow interquartile ranges, indicating a strong consensus that these conditions are acceptable. However, as the number of people increases to 30 (P_30), the median score declines toward the neutral threshold of 5, and the variability of responses widens, suggesting growing disagreement among visitors and a shift in perception toward crowding being less acceptable. At the highest level of visitor presence (P_60), the median acceptability score falls below 5, signaling that a majority of respondents perceive this crowding level as unacceptable. Visitors who have experienced traveling to this location said that the average maximum level of crowdedness is 43/100 people, which is the acceptable threshold for them to continue their travel itinerary, while the maximum level of crowdedness is 63/100 people, which is the maximum threshold that makes them stop traveling here. For visitors who have not traveled to Fansipan, the maximum level is lower than that of visitors who have experienced traveling to Fansipan. These findings highlight a critical threshold around 30 people, beyond which crowding begins to significantly degrade the visitor experience. From a management perspective, this suggests the need for crowd control measures and visitor dispersal strategies to maintain the perceived quality of the tourist experience at Fansipan.

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
per_0	1	49	6.86	2.010	.287	6.28	7.43	1	9
	2	25	7.24	2.538	.508	6.19	8.29	1	9
	Total	74	6.99	2.193	.255	6.48	7.49	1	9
per_5	1	49	7.06	1.842	.263	6.53	7.59	2	9
	2	25	7.60	1.708	.342	6.90	8.30	4	9
	Total	74	7.24	1.804	.210	6.83	7.66	2	9
per_10	1	49	7.20	1.443	.206	6.79	7.62	4	9
	2	25	6.24	2.697	.539	5.13	7.35	1	9
	Total	74	6.88	1.993	.232	6.42	7.34	1	9
per_15	1	49	6.96	1.914	.273	6.41	7.51	2	9
	2	25	5.92	2.344	.469	4.95	6.89	2	9
	Total	74	6.61	2.112	.246	6.12	7.10	2	9
per_30	1	49	5.71	2.318	.331	5.05	6.38	2	9
	2	25	4.68	2.780	.556	3.53	5.83	1	9
	Total	74	5.36	2.513	.292	4.78	5.95	1	9
per_60	1	49	4.78	2.303	.329	4.11	5.44	1	9
	2	25	3.40	2.646	.529	2.31	4.49	1	8
	Total	74	4.31	2.493	.290	3.73	4.89	1	9

Notes Group 1: Travellers already visited Fansipan

Group 2: Travellers who have never been to Fansipan

Per_0: Landscape without visitors; Per_5: Landscapes with a few visitors; Per 10: Landscape with several visitors; Per 15: Landscape relatively crowded; Per 30: Landscape with a crowding case;

Per 60: Landscape with overcrowding cases

4. DISCUSSION OF FINDINGS

Through descriptive statistical analysis, it is possible to compare the different results between the feelings of visitors who have traveled to Fansipan and visitors who have never traveled to Fansipan. For them, the average maximum level of crowdedness is 64/100 people, which is the acceptable threshold for them to continue their travel itinerary, while the maximum level of crowdedness is 85/100 people, which is the maximum threshold that makes them stop traveling there. Overall emotional attachment implies potential for destination loyalty, even if some dissatisfaction exists. Responses likely show a moderate to strong emotional bond with the site, such as: "*I would recommend Fansipan to others"* or "*I feel connected to this place*". This suggests that emotional bonds can act as a buffer against negative perceptions and foster resilience in destination relationships (Yuksel et al., 2010).

There is a high percentage of respondents chose "crowded" or "very crowded," which suggests that the number of visitors exceeds the psychological carrying capacity; while tourists may feel stress, dissatisfaction, or a decline in the

sense of authenticity. In the case of Fansipan, this is consistent with the impact of the cable car system, which has increased peak visitation dramatically. Additionally, high dissatisfaction could reflect overloaded infrastructure or poor service management. If positive ratings dominate, it could show that Sun Group's investment in the cable car is perceived as a convenience, even if it contributes to crowding. There is often a tension between ease of access and the degradation of experience quality in remote natural areas. Perceived destination quality usually includes evaluations of such factors like: cleanliness, natural landscape preservation, cultural atmosphere, availability of services (Vaujany et al., 2019). A split perception is common at Fansipan since tourists may appreciate the infrastructure and views (positive quality perception); whereas others may criticize the over-commercialization, "theme-park" feel, or loss of sacredness. This finding is aligned with several previous research, which claimed that high dissatisfaction, as a strong indicator when a destination is struggling to effectively manage the flow of visitors and provide a consistently high-quality experience, whether due to physical limitations or operational inefficiencies (Drápela, 2023, Peeters et al., 2018; Pinto et. Al., 2006).

In brief, tourists' emotional responses toward Fansipan Mountain reveal a predominantly positive affective experience despite the challenges associated with overtourism. The majority of respondents reported feelings of happiness, excitement, and satisfaction, emphasizing Fansipan's strong aesthetic appeal and symbolic significance as the highest peak in Indochina. Many visitors expressed a sense of pride and personal achievement, underscoring the destination's status as a meaningful and memorable landmark. While some responses reflected concerns over crowding and commercialization, these negative sentiments did not significantly overshadow the overall enjoyment of the visit. Tourists also demonstrated a moderate to strong emotional attachment to the site, with many indicating a willingness to recommend the destination to others. These findings, similar to previous studies by Chou et al. (2024) and Aditama et al. (2023) suggest that emotional value and iconic status can buffer the negative impacts of mass tourism to some extent, but also highlight the need for better visitor management to preserve the integrity of the experience and maintain long-term destination loyalty.

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
per_0	2.563	1	72	.114
per_5	.193	1	72	.661
per_10	19.498	1	72	.000
per_15	3.681	1	72	.059
per_30	3.023	1	72	.086
per_60	.832	1	72	.365

Table 4. ANOVA test result of Homogeneity of Variances

The general findings of this study support Manning (2002), suggesting that the number of visitors at a destination should remain below 30 PAOT. This is particularly important for sites with unique natural landscapes, where tourists prefer fewer people to enhance their experience. However, at natural attractions that involve some level of risk, tourists feel more at ease when a few others are present, though not in large numbers. This is understandable; if the space is empty or too crowded, anxiety will arise. This study confirms the difference between the two selected groups of travellers.

5. CONCLUSION

This study investigates tourism crowding at Fansipan, with the aim of contributing foundational insights and empirical data to inform future tourism management strategies. Given the increasing importance of sustainable tourism for ensuring the long-term environmental, economic, and socio-cultural viability of destinations, this research examines the tensions between growing tourist demand and the carrying capacity of Fansipan's natural environment. Through data-driven analysis, the study offers recommendations intended to support policymakers, planners, and tourism operators in making informed decisions that align with the United Nations Sustainable Development Goals (SDGs). From a sustainable tourism perspective, the crowding phenomenon at Fansipan underscores the mounting conflict between enhancing mass accessibility and preserving the quality of the visitor experience alongside environmental integrity. The

rapid increase in tourist numbers—facilitated by the introduction of the cable car system and intensified promotional campaigns—has undoubtedly improved access to the site. However, these developments have also led to concerns over surpassing both psychological and ecological carrying capacities. A boxplot analysis conducted as part of this research indicates that visitor acceptability sharply declines when group sizes exceed 30 individuals, suggesting that the current tourism intensity may already be compromising visitor satisfaction. Additionally, such crowding contributes to environmental risks including soil erosion, waste accumulation, and visual pollution, particularly within the fragile high-altitude ecosystem of the Hoang Lien Son mountain range.

The case of Fansipan illustrates how unchecked tourism growth may jeopardize sustainability by undermining both environmental resilience and the authenticity of tourist experiences. Without effective crowd management strategies, including zoning regulations and comprehensive visitor education, there is a significant risk that Fansipan will evolve into an over-commercialized destination, ultimately devaluing its natural and cultural heritage. In this regard, some practical implications should be addressed to the local authority and Destination Management Organization: (i) establishing visitor caps and zoning protocols will help reduce congestion at key sites, such as the summit and cable car station; (ii) strengthen visitor education initiatives by developing educational campaigns and interpretive programs, with digital platforms, signage, and guided tours; (iii) shift the development model from volume-focused tourism to one emphasizing quality experiences and higher per-visitor spending; (iv) implement open-access systems for real-time monitoring of visitor flows and environmental indicators; (v) community-based tourism initiatives can enhance sustainability and foster stewardship of cultural and natural resources.

It is important to note that this study is in its preliminary phase and is based on a limited sample size, which may introduce biases and limit the generalizability of findings. Furthermore, the focus on a narrow range of stakeholder groups may affect the comprehensiveness of the analysis. In addition, the absence of publicly accessible official data poses challenges to data triangulation, rendering current measurements exploratory and primarily indicative. Future studies with broader stakeholder representation and improved data access will be essential to validate and expand upon these initial findings.

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THE GREEN CONSUMPTION TREND AND CHALLENGES FOR RETAIL BUSINESSES IN VIETNAM

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ABSTRACT

The global environment is increasingly under threat, making the green consumption trend an essential factor in promoting sustainable development. This study analyzes the rise of the green consumption trend in Vietnam, focusing on the drivers that influence consumers to choose environmentally friendly products and services. Additionally, the paper highlights the challenges retail businesses in Vietnam face when adapting to this trend, including difficulties related to investment capital, production technology, and incomplete legal regulations. Through this analysis, the research proposes solutions to help retail businesses in Vietnam overcome obstacles, enhance consumer awareness of green consumption, and contribute to sustainable development in Vietnam.

Keywords: challenges, green consumption trend, retail businesses, sustainable development

1. INTRODUCTION

Green consumption, also known as sustainable consumption, refers to the use of goods and services that meet basic needs while minimizing environmental impact (D'Souza et al., 2020; Țîmbalari, 2023). The United Nations Commission on Sustainable Development (UNCED, 1992) defines it as consumption that enhances quality of life while reducing resource use, waste, and pollution to safeguard future generations. The concept emerged in the late 1960s and 1970s as industrial expansion led to environmental concerns, prompting consumers to adopt eco-friendly behaviors such as recycling, using renewable energy and reducing waste (United Nations, 2020).

Sustainable development, as defined by the Brundtland Commission, is development that meets present needs without compromising future generations' ability to meet theirs. This approach integrates environmental policies with economic strategies to ensure long-term ecological balance. The United Nations Environment Programme (2020) emphasizes that sustainable consumption and production aim to decouple economic growth from environmental degradation, promoting resource efficiency and sustainable lifestyles (D'Souza et al., 2020). Green consumption plays a crucial role in achieving sustainability by encouraging responsible consumer behavior and corporate practices that prioritize environmental protection (The United Nations Environment Programme, 2020). Governments, businesses, and individuals must collaborate to implement policies and innovations that support green consumption, ensuring a transition toward a more sustainable global economy (World Economic Forum, 2024).

In the context of global challenges such as climate change, environmental pollution, and the depletion of natural resources, green living has become a critical trend that increasingly captures consumers' attention (D'Souza et al., 2020; Țîmbalari, 2023). In Vietnam, awareness of the importance of environmental protection is rising, leading to changes in consumer behavior. Consumers are now prioritizing environmentally friendly products and services more than ever, as evidenced by the growing demand for organic, eco-friendly, and socially responsible products (The Ministry of Industry and Trade of Vietnam, 2023). This shift not only requires consumers to change their consumption habits but also presents significant challenges for retail businesses in Vietnam. Retailers must adjust their production, supply, and marketing strategies to meet the increasing demand of the green market. This transformation is not only crucial for business survival but also offers a competitive advantage in an increasingly fierce market environment. If Vietnamese retail businesses do not promptly adapt to the green consumption trend, they risk losing customers, reducing market share, and falling behind competitors (Vu, 2024).

Furthermore, adopting sustainable and environmentally friendly solutions contributes not only to planet conservation but also to promoting the sustainable development of the national economy. Therefore, studying the green lifestyle trend and the challenges faced by Vietnamese retail businesses in the current green consumption context is highly necessary.

This research aims to identify the factors influencing green consumption behavior and propose effective solutions to help businesses transform and grow sustainably. This will not only contribute to economic development but also protect the environment, improve the quality of life for the community, and ensure a sustainable future for future generations.

2. GREEN CONSUMPTION TRENDS IN VIETNAM

According to a survey by Pew Research Center, 32% of Generation Z participants are willing to engage in environmental protection activities, highlighting this generation's significant interest in sustainability and planetary conservation. For Gen Z, a green lifestyle has become an essential part of their daily routine, not merely a passing trend (Dimock, 2019). In Vietnam, the increasing consumer demand has prompted many businesses to adapt their strategies, opting for "green and clean" approaches to gain a competitive edge. Many companies have made significant investments in technology and equipment to enhance production processes with the goal of achieving sustainable production. Some factories have installed renewable energy systems to ensure a stable supply of clean energy while implementing solutions to save electricity and water during production. Moreover, numerous supermarkets and businesses in the food and beverage (F&B) sector have prioritized the development and distribution of "green" products, gradually transitioning to eco-friendly packaging and materials, instead of single-use plastics and nylons (Vu Phong Energy Group, 2022).

The Ministry of Industry and Trade of Vietnam (2023) highlighted that the Prime Minister approved Decision No. 889/QD-TTg, endorsing the National Action Program on Sustainable Production and Consumption for the 2021-2030 period. This program not only aims to promote sustainable production and consumption but also sets specific goals to encourage the creation of environmentally friendly products and materials. Initiatives within the program include developing products that are recyclable, reusable, and renewable, thereby contributing to minimizing negative environmental impacts. This demonstrates Vietnam’s commitment to building a green and sustainable economy while raising consumer awareness about the importance of choosing eco-friendly products. The Ministry of Industry and Trade (2023) also noted that green methods have been implemented in supermarkets and wholesale markets to reshape consumer perceptions of the role of environmentally friendly products. Retailers have reported a stable increase in the consumption of green products over the past five years. This growth not only reflects changes in consumption habits but also indicates that more people are recognizing the importance of supporting sustainable products. This trend creates a positive consumer environment while motivating businesses to adjust their products to meet the increasing demand from consumers.

A survey by Nielsen Vietnam revealed that approximately 31% of consumers are willing to pay a premium for green products, reflecting a heightened awareness and commitment to environmental protection. This shift indicates that consumers are becoming more conscious of the positive impact of green products, not only for themselves but also for the community and the environment (Le, 2023). Using green products has become a crucial factor in minimizing negative impacts on the environment and society throughout a product's lifecycle, from production to use and disposal. In recent years, many green consumption models have gained widespread and enthusiastic support from the community. Initiatives such as using banana leaves to wrap vegetables, glass water bottles, bamboo, paper, or grass straws, natural soaps, dining kits made from sugarcane pulp, and biodegradable garbage bags have been warmly welcomed. These changes not only reflect a shift in consumption habits but also serve as evidence of the growing public interest in environmental protection and sustainable development (Communist Party of Vietnam Online Newspaper, 2023).

Many bubble tea and coffee shops are embracing green consumption trends by using bamboo or stainless-steel straws instead of plastic ones, limiting hard-to-decompose bottled water, and replacing plastic bags with paper bags. Airlines such as Vietjet and Bamboo are also focusing on using eco-friendly products on their flights. Additionally, many private organizations are encouraging people to exchange plastic bottles for green plants. This trend has also led to the rise of many clean food chains like “Sói Biển”, “Bác Tôm”, and “Hano Farm”, meeting the public’s demand for clean products. Vinamilk has launched green farm chains, while Vinamit turns Vietnamese agricultural products into green and clean offerings for export and domestic consumption (Minh, 2024).

The economic development in urban areas, along with increasing energy consumption, is placing significant pressure on the environment, exacerbating pollution, particularly in Vietnam’s major cities. Therefore, environmental protection, especially in urban areas, has become a critical issue emphasized by the Party and the Government in the national

development strategy. On a global scale, environmental pollution is a severe issue in many developing countries, and Vietnam is no exception. As a result, environmental protection has become a priority in economic and social development strategies, particularly during the country's industrialization and modernization phase (Communist Party of Vietnam Online Newspaper, 2024). Currently, nearly 90% of consumers express strong support for businesses that operate ethically and with social responsibility. Notably, they believe that companies focusing on these aspects not only contribute to environmental protection but also enhance community values. Furthermore, about 43% of consumers reported having a more favorable impression of environmentally friendly brands, demonstrating that a commitment to sustainability is becoming a key factor in consumer perception and purchasing decisions (Vu, 2024).

Data from the survey "Green Consumption Awareness and Behavior 2024" published by the Association of High-Quality Vietnamese Goods Enterprises (2024) shows that consumers know about green products and green consumption mostly from information on cyberspace (69%), information sources (personal experience, relatives, sellers, etc.) are accessed at a certain rate (less than 40%). Several previous surveys have also shown that when referring to product information, consumers often rely mainly on personal experience, or consult relatives, friends, or sellers, etc., and then on information from cyberspace. Through accessing information channels on green consumption, it can be seen that for most consumers, the issue of green consumption is still quite new, with a mindset of not having much consumer experience, so information from cyberspace has become the main source of information.

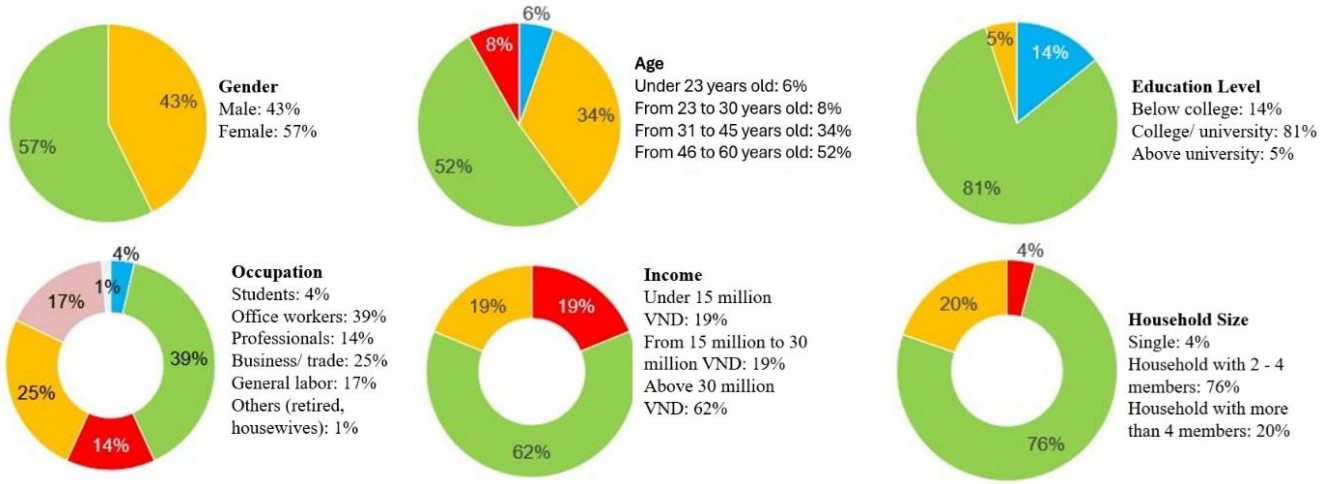


Figure 1. Portrait of green product consumers

Source: Association of High Quality Vietnamese Goods Enterprises (2024)

According to the Ministry of Industry and Trade, the demand for green products in Vietnam is expected to grow by an average of 15% per year from 2021 to 2023. A survey found that 72% of Vietnamese consumers are willing to pay more for green products, reflecting growing awareness of environmental protection. However, challenges remain (Minh Anh, 2024). A 2024 study found that the proportion of green consumers in Hanoi and Ho Chi Minh City is only about 12% - 18%, with the biggest barrier being the high price of green products. The main customers of green products are usually consumers aged 31 to 45, with a university degree and an income of VND15 million to VND30 million. The green product market is also expanding. Euromonitor's report shows that the organic food market in Vietnam will reach a value of 100 million USD by 2023, growing 20% compared to 2020. Sales of biological cleaning products will increase by 15% in 2022 compared to 2021, and the sustainable fashion industry will attract more than 1 million consumers in 2023. These figures show that green consumption is gradually becoming an important part of Vietnamese people's lives (Tra My, 2024).

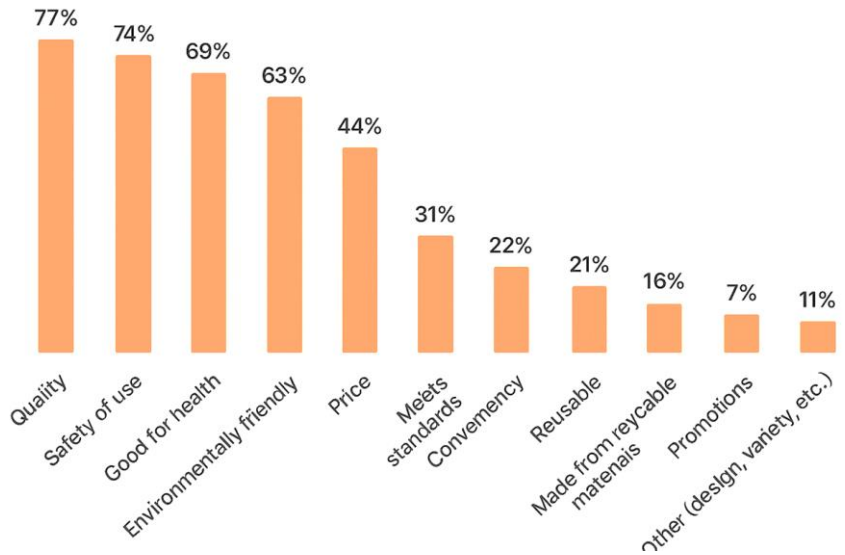


Figure 2. Criteria for Choosing Green Products

Source: Association of High Quality Vietnamese Goods Enterprises (2024)

Data from the survey "Green Consumer Awareness and Behavior 2024" published by the Association of High-Quality Vietnamese Goods Enterprises showed that when choosing to buy green products, in addition to the criteria (quality, safety, good for health) that consumers are most concerned about as when they choose to buy regular products, the factor of environmentally friendly products is also of great concern to them when choosing to buy green products (63%). Environmentally friendly criteria become a measure of consumers' evaluation of products, a factor that creates an impression and trust in consumers when choosing to buy green products.

3. CHALLENGES OF RETAIL BUSINESSES IN VIETNAM IN THE CONTEXT OF GREEN CONSUMPTION

Recent studies highlight the growing emphasis on environmental sustainability among businesses and consumers in Vietnam. The Vietnamese government is also prioritizing sustainability through Decision No. 889/QD-TTg, which promotes green production and consumption (Ministry of Industry and Trade, 2023). Experts emphasize the need for improved government policies, financial support, and increased awareness to accelerate sustainable development (Quynh, 2022; Vu, 2024; Ta, 2024). Overall, Vietnam is making steady progress in green consumption, driven by growing consumer demand and strategic government initiatives, though financial and regulatory hurdles remain key challenges.

Table 1. Challenges of retail businesses in Vietnam in the context of Green consumption

Author (Year)	Research Name	Risks	Challenges	Suggestions for Solving Challenges
Quynh (2022)	Green Economy Development in Vietnam	Incomplete policies	Lack of specific regulations, outdated production technology	Improve legal framework, enhance financial support mechanisms
Vu (2024)	Retail Business Transition to Green Economy	Limited investment capital	Difficulty accessing funding, lack of information on support policies	Government and financial institutions should provide better funding programs
Ta (2024)	Legal Policies and Green Consumption	Ineffective information dissemination	Lack of awareness among businesses and consumers	Strengthen communication and education on sustainability policies
Minh Anh (2024)	Green Consumption Awareness and Behavior	High cost of green products	Low adoption rate among consumers	Develop incentives and subsidies to make green products more affordable

Source: Author synthesis

Quynh (2022) stated that the development of a green economy in Vietnam is facing numerous challenges due to both objective and subjective factors. Firstly, the mechanisms and policies related to the green economy are not yet complete, mainly remaining at the proposal stage without specific regulations. Secondly, wasteful consumption habits and limited environmental awareness persist within the community and businesses. Thirdly, financial resources for green economic development are lacking, heavily relying on the state budget without effectively leveraging private sector resources. Additionally, outdated production technology leads to inefficiency and environmental pollution. Lastly, Vietnam is heavily impacted by climate change, creating significant challenges for building a green economy. These issues require the joint efforts of the government, businesses, and the community to move towards a more sustainable future.

The study indicates that to successfully build a green economy, a coordinated effort among government agencies, businesses, and the community is essential to shift perceptions and encourage the adoption of sustainable development solutions. Currently, many businesses in Vietnam recognize the importance of sustainable production for their competitiveness and long-term survival. They understand that adopting green production methods not only helps businesses achieve sustainable development but also contributes to environmental protection.

However, Vu (2024) pointed out that many retail businesses struggle to secure the necessary investment capital for this transition, mainly due to a lack of information about support policies and suitable financial models. This transition process requires support not only from businesses but also from governmental agencies and financial institutions to create a favorable environment for the development of sustainable solutions. Meanwhile, Ta (2024) emphasized the need to improve communication and education about legal policies to raise awareness among the public and organizations about existing regulations. He also noted that ineffective information dissemination, coupled with a lack of specific regulations and enforcement measures, hinders the strict application of the law. Furthermore, the absence of adequate tools and resources in management remains a significant barrier, impeding the implementation of sustainable policies. Improving these factors is crucial to enhancing the quality and efficiency of state management in sustainability.

The development of green consumption trends among Vietnamese retail businesses is currently facing significant challenges, affecting their ability to transition to a green economy and achieve sustainable development. Although most retail businesses have recognized the importance of sustainable production for their competitiveness and long-term growth, the implementation process still encounters numerous obstacles. One of the biggest challenges is mobilizing the necessary investment capital for green production methods. Particularly for small and medium-sized enterprises, financial constraints and difficulties in accessing preferential funding sources have caused delays in adopting green production solutions. Additionally, a lack of information about supportive policies, along with the complexity of administrative procedures, has made it difficult for many businesses to take advantage of funding programs and incentives from the government and financial institutions.

Furthermore, the promotion and education on policies related to green consumption and sustainable development remain limited. Information about legal regulations and green production standards is not widely and clearly disseminated, leading to a lack of understanding among the public and organizations about the essential requirements and procedures. This situation not only creates confusion in policy implementation but also widens the gap between awareness and actual actions. Communication programs have not yet effectively fostered a positive change in the attitudes and behaviors of consumers and businesses. Additionally, the regulatory framework and policies for green economy implementation in Vietnam are still incomplete. Legal documents often lack specificity and are difficult to apply in practice, leading to a situation where many businesses do not know where to start in the green transition process. Regulations and standards are still more directional than prescriptive, with insufficient strict sanctions for violations, reducing enforcement effectiveness. At the same time, wasteful consumption habits and limited environmental awareness within the community create significant barriers to the development of green consumption trends. Many consumers still prioritize low-cost products over sustainability and environmental friendliness. Moreover, production technology in Vietnam remains outdated compared to developed countries.

The adoption of green technologies requires significant investment in machinery, equipment, and new production processes, but not all businesses have the capacity to do so. Outdated production technology not only reduces production efficiency but also causes many negative impacts on the environment, such as air, water, and soil pollution. In addition,

the impact of climate change is creating many challenges for building a green economy. Extreme weather events, natural disasters, and changes in the natural environment not only hinder business operations but also require businesses to adjust their strategies and operating methods to adapt to new conditions. To overcome these difficulties, close cooperation between the government, businesses, and the community is needed to change perceptions and encourage the adoption of sustainable development solutions. The government needs to play a proactive role in improving the legal framework, developing financial support mechanisms, and enhancing communication and education efforts. Businesses need to take the initiative in exploring and applying green technologies, as well as developing business strategies toward sustainability. The community also needs to raise awareness and support eco-friendly products and services. Only with strong consensus and coordinated efforts from all three parties can Vietnam truly achieve its goal of green and sustainable development in the future.

4. PROPOSED SOLUTIONS TO HELP RETAIL BUSINESSES IN VIETNAM OVERCOME CHALLENGES

To overcome the challenges of the green consumption trend in Vietnam, businesses need practical, proactive, and flexible solutions to adapt to market demands and enhance their competitiveness. For success, businesses must not only focus on internal policies but also seek support from the government and collaborate with the community. The following solutions are proposed to help businesses seize opportunities and overcome obstacles in the increasingly evolving green consumption landscape.

4.1. Process improvement and sustainable business strategies

Enterprises need to take the lead in optimizing production processes and enhancing product quality according to green standards. This not only strengthens their market position but also creates differentiation in the eyes of consumers. These strategies include using recycled materials, applying energy-saving technologies, and minimizing waste in production. Additionally, businesses should develop a sustainable transition roadmap with specific steps to ensure long-term adaptability to green practices. Implementing a circular economy model, where products are designed for maximum reuse and recycling, is also a viable strategy. A comprehensive quality management system should be established to closely monitor processes from raw materials to finished products, ensuring compliance with green and eco-friendly standards.

4.2. Enhancing awareness and internal training

Within the organization, raising awareness of green consumption is essential to create consensus at all levels. Training programs and education on the benefits of green consumption and sustainable production processes will help employees understand the importance of integrating green models into business operations. Regular workshops and conferences to update new trends are also necessary, enabling employees to adapt flexibly to market changes. Building a green corporate culture is equally important, encouraging staff participation in environmental initiatives such as green workdays, energy-saving campaigns, and office recycling programs. These initiatives not only foster a positive work environment but also help spread green awareness to employees' families and communities.

4.3. Developing green products and effective marketing campaigns

One of the key factors for business success in the green consumption trend is the development of environmentally friendly products. Businesses can research and create products that are recyclable or use renewable materials, meeting the increasing consumer demand for green products. In addition to product development, marketing campaigns should highlight the green values of the products, making it easier for consumers to recognize and choose eco-friendly products. Utilizing green advertising methods, such as environmental certifications and green labels, is an effective way to build trust with customers. Collaborating with environmental organizations to launch promotional programs that combine with environmental protection, such as "Buy Green - Plant Green," can also increase social value and raise community awareness about the importance of green consumption.

4.4. Seeking funding and government policy support

In the context of green consumption development, seeking funding and government support policies is crucial. The government can consider financial incentives such as tax exemptions, preferential loans, or subsidies for businesses implementing green technologies. This creates favorable conditions for enterprises to invest in environmental initiatives

and enhance production efficiency. Additionally, businesses can explore and participate in state incentive programs that support the transition to a green economy. This includes leveraging research and development (R&D) funds to test new green solutions, thereby not only improving products but also contributing to sustainable development for society and the community.

4.5. Collaborating with partners in the green ecosystem

Collaboration between businesses and partners within the green ecosystem, including suppliers, non-governmental organizations, and government agencies, creates a supportive network for developing green consumption initiatives. Enterprises can leverage resources from partners to enhance innovation, share green technologies, and build sustainable production standards. Collaboration also helps businesses improve production processes, reduce costs, and optimize resources, ensuring profitability while maintaining environmental commitments. Furthermore, connecting with partners in the green supply chain helps businesses achieve international environmental certifications, expanding export markets and enhancing brand value in the global market.

4.6. Promoting education and building green consumption habits in the community

Beyond internal measures, businesses need to play an active role in promoting awareness and green consumption habits in the community. Social media campaigns and promotional programs on the benefits of green consumption help consumers better understand the positive impact of choosing eco-friendly products. Businesses can also organize events and green product fairs, offering consumers opportunities to experience and access green products, thereby creating a lasting bond between consumers and businesses. Additionally, sponsoring environmental education projects in schools and communities contributes to building a generation with a strong sense of environmental responsibility.

4.7. Driving digital transformation and applying green technology

Finally, digital transformation and green technology adoption are crucial for businesses to keep up with the green consumption trend. Implementing digital technologies in management and production helps enterprises optimize operations, minimize waste, and create high-quality products at lower costs. Investment in green technologies, such as renewable energy, recycling systems, and production automation, is essential to ensure sustainable business practices. This not only reduces environmental impact but also enhances competitiveness, enabling businesses to meet modern consumer demands. Moreover, adopting green management software and big data analytics supports enterprises in forecasting green consumption trends, helping them develop products and services that align more closely with market needs.

5. CONCLUSION

The green consumption trend in Vietnam is becoming increasingly important amid environmental and climate change challenges. However, this growth still faces many obstacles, including incomplete policy frameworks, unsustainable consumption habits, and financial constraints. Promoting green consumption requires close coordination between the government, businesses, and the community. Improving policies, raising consumer awareness, and developing green technologies are essential solutions. If implemented synchronously, these measures will not only protect the environment but also drive sustainable development for the country. With strong commitment from all stakeholders, the green consumption trend will become an integral part of the Vietnamese lifestyle.

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SUSTAINABLE BRANDING IN THE DIGITAL AGE: A REVIEW OF PREVIOUS STUDIES

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ABSTRACT

This study offers a systematic review of the academic literature concerning sustainable branding within the context of digital transformation, aiming to identify key trends, significant challenges, and potential research opportunities in this rapidly expanding field. Utilizing the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology, the study analyzed scientific articles published from 2015 to 2024, sourced from reputable databases including Scopus, Web of Science, and Google Scholar. The findings can be categorized into three primary approaches: (1) digital branching, (2) sustainable branching, and (3) an integrated model encompassing brand, digital technology, and sustainable development. The study identifies three prominent gaps: (i) a scarcity of empirical studies in developing markets, (ii) the absence of a standardized measurement framework for brands integrating digital and sustainability elements, and (iii) insufficient exploration of the impact of emerging technologies such as the metaverse and Web3 on brand strategy. Consequently, this research proposes future directions, including the development of multi-dimensional scales such as the Sustainable Digital Transformation Index and the exploration of the role of circular business models in constructing sustainable brands in the digital era.

Keywords: Circular Economy, Digital Transformation, Sustainable branding,

1. INTRODUCTION

In the 21st century, the digital revolution fundamentally transformed the formation, management, and experience of brands. The rapid advancement of technologies such as artificial intelligence (AI), big data, social media, and the Internet of Things (IoT) has expedited the shift from a traditional brand model to a digital interactive brand model, wherein consumers occupy a central position in the value chain (Keller, 2020; Wamba et al., 2021). A contemporary brand transcends being merely a symbol representing a product or service; it serves as a medium for conveying values, culture, and corporate identity through increasingly flexible and highly personalized digital channels. Concurrently, the demand for sustainable development is being increasingly emphasized by numerous stakeholders, particularly the younger generation of consumers, such as Millennials and Gen Z. According to Nielsen (2019), 67% of global consumers are willing to pay a premium for products and services from brands that demonstrate a clear commitment to sustainability goals including environmental protection, social justice, and transparent governance (ESG). This indicates that, in the current context, brands must not only optimize operational efficiency but also exhibit profound and enduring social responsibility (Baumgartner & Rauter, 2017).

The intersection of digital technology and the imperative for sustainable development is affecting significant transformations in contemporary brand strategies. Bharadwaj et al. (2013) contend that today's digital business strategy transcends mere trend status, serving as a fundamental driver of competitive advantage, facilitating real-time brand engagement, personalizing consumer interactions, and enhancing operational efficiency. Concurrently, digital platforms, notably social media, are democratizing the brand-consumer relationship, necessitating heightened transparency and social accountability (Davenport et al., 2020). Despite these opportunities, this transformation presents numerous challenges. Artificial intelligence can aid in behavior prediction and supply chain optimization, whereas blockchain technology enables brands to disclose product origins transparently (Davenport et al., 2020; Tapscott, 2016). Nevertheless, concerns such as data privacy, the carbon footprint of digital infrastructure, and the issue of "greenwashing" impose increasingly rigorous demands on brand governance (Tariq et al., 2023; WEF, 2023). In this context, examining

the nexus between digital transformation and sustainable branding is not only essential but also holds strategic significance in shaping future brand models. Brands are progressively evolving into digital ecosystems that integrate value, innovation, and social responsibility rather than merely serving as communication tools.

However, a review of the literature reveals three significant theoretical gaps. First, most studies address digital and sustainable branding separately, lacking an integrated framework that captures the interactive nature of these dimensions in governance practice (De Jong et al., 2021). Second, research predominantly focuses on Western contexts, while developing markets—experiencing the fastest digitalization rates globally—remain underexplored (Sheth 2021). Third, emerging technologies such as Web3, metaverse, and generative AI are transforming brand-consumer interactions but have yet to be incorporated into existing theoretical models, particularly in the context of ethical governance and sustainable development (Chui et al., 2023).

To address these gaps, this study conducted a systematic literature review following the PRISMA guidelines, utilizing data from three esteemed academic sources: the Web of Science, Scopus, and Google Scholar. The documents are categorized into three primary groups: (1) Digital Branding, (2) Sustainable Branding, and (3) the Brand-Digital-Sustainability Integration Model. Based on this classification, the research analyzes the content, synthesizes theories, identifies academic gaps, and proposes future research directions aligned with the global context of innovation and digitalization.

2. THEORETICAL BASIS

2.1. Core concepts

2.1.1. Sustainable branding

Sustainable branding is understood as the process of building and managing a brand not only based on economic value but also by integrating social and environmental factors to create long-term value for the business, the community, and the planet. A sustainable brand demonstrates a company's commitment to sustainable development through its products, processes, communication, and behavior (Belz & Peattie, 2012; Chatterji et al., 2009). Rather than solely prioritizing profit objectives, these brands commit to generating positive societal and environmental values (Rady, 2023). As noted by Baumgartner and Rauter (2017), a sustainable brand extends beyond profit optimization to demonstrate a commitment to reducing adverse environmental impacts and actively contributing to societal well-being. This equilibrium aims to secure long-term advantages for both the business and the broader community and planet (Keller 2020).

Sustainable branding encompasses three core dimensions: social, environmental, and economic responsibility. Social responsibility involves a brand’s commitment to ethical practices, labor fairness, human rights, and community engagement (Carroll & Shabana, 2010). Actions such as supporting education, healthcare, gender equality, and local development reinforce this role (Kotler & Lee, 2005). Environmentally, sustainable brands reduce carbon emissions, adopt renewable energy, use eco-friendly packaging, and comply with standards like ISO 14001 (Hartmann & Apaolaza-Ibáñez, 2012). Green marketing strategies are also employed to promote sustainable consumption (Peattie & Belz, 2010). Economically, sustainable brands aim for long-term financial viability while fairly distributing value among stakeholders (Freeman et al., 2010). Business models like the circular economy help optimize resources, minimize waste, and improve efficiency, contributing to both profitability and a more responsible economy (Geissdoerfer et al., 2017).

2.1.2. Digital Transformation

Digital transformation refers to the integration of advanced technologies such as Artificial Intelligence (AI), Big Data, and Social Media into brand management and development activities. This transformation enables businesses to optimize customer experience, enhance the effectiveness of marketing strategies, and foster brand loyalty (Vargo & Lusch, 2017). Bharadwaj et al. (2013) noted that digital technology encompasses electronic tools, systems, devices, and resources that can create, store, and process data. These technologies include social media, online platforms, AI, Internet of Things (IoT), big data, cloud computing, and mobile technology. In essence, the term "digital" pertains to a collection of technologies that utilize digital data to efficiently collect, store, process, analyze, and transmit information. Within the realm of brand governance, digital technologies not only function as operational tools, but also establish a novel interactive environment in which brands can engage directly and continuously with consumers.

2.3. Related theories

2.3.1. Stakeholder Theory

The Stakeholder Theory, as developed by Freeman (1984), posits that businesses are not solely accountable to shareholders but must also fulfill responsibilities towards all stakeholders, including customers, employees, suppliers, communities, and the environment. In the digital era, the heightened connectivity and capacity for stakeholders to respond instantaneously have amplified the significance of stakeholders in brand strategy. Businesses must actively engage, interact, and respond to stakeholders through social networks, digital platforms, and digital media channels to sustain brand trust and loyalty. Corporate Social Responsibility (CSR) has evolved from being a supplementary activity to becoming an integral component of a sustainable brand strategy (Carroll & Shabana, 2010).

2.3.2. Resource-Based View (RBV)

Stakeholder Theory, as articulated by Freeman (1984), posits that businesses have obligations not only to shareholders but also to a wider array of stakeholders, including customers, employees, suppliers, communities, and the environment. In the digital era, the enhanced connectivity and capacity of stakeholders to respond instantaneously have amplified their significance in brand strategy. Businesses must actively engage, interact, and respond to stakeholders through social networks, digital platforms, and digital media channels to sustain brand trust and loyalty. Corporate Social Responsibility (CSR) has evolved from being a supplementary activity to becoming an integral component of a sustainable brand strategy (Carroll & Shabana, 2010).

2.3.3. Triple Bottom Line (TBL)

The concept of the Triple Bottom Line (TBL), as proposed by Elkington (1997), posits that the efficacy of a business should be evaluated not solely on the basis of profit but must also encompass its impact on people and the planet. TBL serves as the cornerstone for establishing a brand aligned with sustainable development, particularly in a digital environment, where information regarding a brand's social and environmental impact is readily disseminated. Contemporary brands are assessed not only by the quality of their products but also by their transparency in Environmental, Social, and Governance (ESG) practices, ethical conduct, and environmental performance, all of which can be effectively communicated through digital platforms (Baumgartner & Rauter, 2017). The incorporation of TBL into brand strategy helps businesses cultivate a trustworthy image and foster sustainable relationships with customers and the community.

3. RESEARCH METHODOLOGY

This study employed a systematic literature review methodology in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency, comprehensiveness, and reproducibility in the academic review process. Data were collected from three prominent scientific databases, Web of Science, Scopus, and Google Scholar, covering the period from 2015 to 2024. The search process utilized keywords such as "sustainable branding," "digital branding," "ESG," "CSR," "digital transformation," and "consumer trust.

The document review and analysis process were executed in three primary steps. Initially, documents were collected and screened based on the criteria of relevance to the research topic, publication date, and academic quality (e.g., citation index, inclusion in prestigious international journals). Only materials that met high academic standards were included in the analysis. Subsequently, thematic classification was performed to organize the works into three principal groups of approaches: (1) Digital Branding, (2) Branding associated with sustainable development (Sustainable Branding), and (3) Brand-digital-sustainable integration model (Digital Sustainability). Additionally, studies related to corporate social responsibility (CSR), ESG governance, digital experience, and customer trust in the digital environment have been incorporated into extensive analysis to ensure comprehensive theoretical coverage.

In conclusion, content synthesis and comparative analysis were conducted to discern the theoretical frameworks employed, prevalent research methodologies, and principal findings of each study. This process facilitated the identification of similarities, differences, and significant trends in the scholarly progression of the research domain. The system overview approach not only offers a comprehensive perspective on the current state of research, but also establishes a robust theoretical foundation for identifying academic gaps and proposing future research directions aligned

with the context of digital transformation and the imperatives of sustainable development in contemporary brand governance.

4. RESULTS & DISCUSSION

4.1. Overview of approaches in previous research

Through the synthesis and analysis of selected academic documents from 2015 to 2024, it is evident that research on branding in the digital age predominantly focuses on three principal approaches: (1) digital brands; (2) brands associated with sustainable development (sustainable brands); and (3) an integrated model encompassing brand, digital, and sustainability elements.

Table 1. Synthesis of 10 main academic documents used as the basis for analysis in research

No	Author(s)	Context / Focus	Method	Key Findings
1	Bharadwaj et al. (2013)	Digital business strategy	Conceptual analysis	Digital strategy is core to competitiveness
2	Baumgartner & Rauter (2017)	Corporate sustainability	Theoretical framework	Sustainability needs integration of ESG factors
3	Keller (2020)	Branding in digital age	Conceptual review	Digital platforms transform brand-customer relations
4	Wamba et al. (2017)	Big Data in operations	Empirical / Data analytics	Big Data improves operations & customer insight
5	Geissdoerfer et al. (2017)	Circular economy & innovation	Theoretical model	Circular economy supports sustainable innovation
6	Mingione & Abratt (2020)	Digital startups & sustainability	Qualitative case study	Branding needs openness and ecosystem approach
7	Lipiäinen & Karjaluoto (2015)	Industrial digital branding	Case study	Digital branding requires internal-external alignment
8	Davenport et al. (2020)	AI & branding ethics	Literature synthesis	AI needs ethical governance in branding
9	Tapscott (2016)	Blockchain & transparency	Case examples	Blockchain enhances trust and traceability
10	Jelonek et al. (2024)	AI in crisis management	Theoretical & practical	AI can personalize and predict brand experiences

Source: Recommended authors

Group 1: Digital Branding

The initial approach focuses on examining the operational and developmental dynamics of brands within the digital landscape, emphasizing the application of contemporary technologies such as artificial intelligence (AI), big data, social media, and the Internet of Things (IoT) to enhance interaction efficiency, personalize customer experiences, and optimize brand governance processes. Keller (2020) posits that digital branding transcends the mere digitization of communication messages, representing a holistic strategy that integrates technology across all stages of brand activities. A representative study in this domain was conducted by Lipiäinen and Karjaluoto (2015), wherein the authors proposed a comprehensive digital brand model tailored for the industrial context, comprising three principal components: internal branding, external branding, and brand positioning within online dialogues. This model underscores the necessity of integrating internal functions to ensure brand consistency and adaptability in a digital milieu. Furthermore, Steenkamp (2020) identified five pivotal trends influencing global brands in the digital era: the proliferation of digital sales channels, co-creation in brand strategy, global transparency, consumer community engagement, and the ascendancy of IoT. Nonetheless, a limitation of this study is its restricted applicability to the B2C sector, and that it does not sufficiently address the influence of local cultural factors within a complex global environment. Jelonek et al. (2024) focused on the role of AI in personalizing customer experiences, predicting consumer behavior, and assisting in real-time media crisis management. While AI offers significant strategic value, the authors also warn about the ethical risks associated with data and the lack of transparency

in algorithms, which requires responsible governance of technology (Davenport et al., 2020). Another prominent trend is the shift from centralized control to an open brand model, as research by Mingione and Abratt (2020) shows that digital startups need to give up traditional brand control to form a brand community on digital platforms. This clearly reflects the shift from war brand strategy to "close" to "co-create," especially in today's decentralized interaction environment. Overall, the digital brand research team has contributed to building a fundamental theoretical framework for the integration of technology and brands in this new era. However, there is still a lack of research on how to balance the technology factor and the human element, the emotional factor that creates the long-term value of the brand (Vargo & Lusch, 2017).

Group 2: Brands associated with sustainable development (Sustainable Branding)

In contrast to the technology-oriented research group, the second group emphasizes the integration of the three pillars of Environmental, Social, and Corporate Governance (ESG) into brand strategy. As consumers increasingly prioritize social responsibility and sustainability, it is imperative for brands to demonstrate commitment to ethics, transparency, and positive community contributions. Keller (2020) posits that a sustainable brand constitutes a long-term development strategy, delivering value not only to the business but also to the entire ecosystem involved. An illustrative example is the study by Lipiäinen and Karjaluoto (2015) on branding in the renewable energy sector. This study introduces a digital brand model that underscores transparency and environmental responsibility within the B2B (Business-to-Business) context, which pertains to transactions between businesses as opposed to those directed at end consumers. However, the scope of the study is limited because it is based on a single case and lacks quantitative indicators to evaluate the economic impact, thereby constraining the generalizability of the model. In contrast to the technology-oriented research group, the second group emphasizes the integration of the three pillars of Environmental, Social, and Corporate Governance (ESG) into brand strategy. As consumers increasingly prioritize social responsibility and sustainability, it is imperative for brands to demonstrate commitment to ethics, transparency, and positive community contributions. Keller (2020) posits that a sustainable brand constitutes a long-term development strategy, delivering value not only to the business but also to the entire ecosystem involved. An illustrative example is the study by Lipiäinen and Karjaluoto (2015) on branding in the renewable energy sector. This study introduces a digital brand model that underscores transparency and environmental responsibility within the B2B (Business-to-Business) context, which pertains to transactions between businesses as opposed to those directed at end consumers. However, the scope of the study is limited because it is based on a single case and lacks quantitative indicators to evaluate the economic impact, thereby constraining the generalizability of the model.

Group 3: Brand – digital – sustainability integration

The integration of brands, digital technology, and sustainable development is a significant research trend in contemporary enterprises. This integrated model leverages technological advancements to enhance operational efficiency, while redefining the social role of brands to align with the growing demands for transparency, social responsibility, and sustainability. As noted by Mingione and Abratt (2020), this model generates dual value by enhancing competitiveness and advancing comprehensive development goals. A notable contribution to this field is research by Mingione and Abratt (2020), which identifies five strategic requirements for transforming digital startups into sustainable brands: strategic flexibility, community building, internal empowerment, external transparency, and the development of a trusted ecosystem. For instance, Patagonia, a renowned fashion brand, has utilized Big Data to quantify carbon emissions and publicly disclose transparent results on digital platforms, thereby enhancing social responsibility and building trust. Furthermore, Tapscott (2016) highlighted the potential of blockchain technology to fundamentally enhance supply chain transparency, enabling consumers to trace products and mitigating "greenwashing." Additionally, studies by Bharadwaj et al. (2013) and Wamba et al. (2017) demonstrate that the integration of AI, IoT, and Big Data into brand strategy not only improves operational efficiency but also facilitates the measurement of social and environmental impacts, a crucial aspect of modern sustainable brands. The study's primary strengths lie in its multifaceted approach to brand themes encompassing technology, sustainability, and rational integration. The incorporation of AI, Big Data, and Social Media into brand operations significantly enhances customer experience, optimizes data utilization, and improves the efficiency of information communication (Jelonek et al., 2024; Keller, 2020). A brand strategy that incorporates sustainable development is crucial in highlighting corporate responsibility towards the environment and society, demonstrating that

sustainability is not merely an ethical consideration, but also a strategic imperative (Baumgartner & Rauter, 2017; Nielsen, 2019). Notably, the third research group, focusing on the integration of brand, digital, and solid elements, offers a comprehensive perspective on "Digital Sustainability" as a goal of sustainability and social justice (Wamba et al., 2020; Wamba et al., 2017).

4.2. Research gaps

Through the integration of various approaches in branding research in the digital era, it is evident that each group of approaches offers substantial contributions to both theoretical and practical domains. Despite these positive contributions, the current study has certain notable limitations. First, some studies employ a limited range of methodologies, predominantly relying on single-case analyses or theoretical syntheses, which poses challenges in generalizing the findings. For instance, Lipiäinen and Karjaluoto (2015) focus solely on a single company within the renewable energy sector, thereby lacking the representation of other industrial sectors. Furthermore, research concerning the application of technology, particularly artificial intelligence (AI), is yet to sufficiently address the ethical and legal challenges associated with data privacy and algorithmic transparency (Davenport et al., 2020). Although AI is regarded as a strategic branding tool, the absence of a clear regulatory framework may adversely affect consumer confidence in the long term.

An important gap in this field is the paucity of empirical studies on the developing markets. To address this deficiency and expand the scope of knowledge, this review incorporates insights from Southeast Asia, a region characterized by rapid digital transformation and a flourishing landscape of innovation and sustainable branding. Studies focusing on this region offer valuable perspectives on the practical implementation of digital sustainability. For instance, Piccolo and Boero (2023) examined Grab, a prominent super app in Southeast Asia, illustrating how the company integrates knowledge management and sustainability strategies to secure long-term competitive advantage through its digital platform. Similarly, a report by the Tech For Good Institute (2023) underscores the role of digital economy companies in enhancing their social and environmental impacts along with economic growth in countries such as Indonesia, Malaysia, Thailand, and Vietnam. Furthermore, Ordoñez de Pablos (2023) highlighted the significance of sustainable digital transformation in Asian society, particularly the potential of AI, IoT, and machine learning to advance a circular economy and social justice. These studies provide a practical foundation for scaling up digital sustainability models in emerging economies, emphasizing the necessity of integrating local and regional cultural elements into the framework of modern brand analysis.

4.3. Proposal for future research directions

Based on the current overview of outreach groups and the identified academic gaps, it is evident that brand research in the digital age has significant potential for expansion. Notably, the rapid development of new technologies such as metaverse and Web3, coupled with the urgent need to assess sustainable brand effectiveness, necessitates new research directions to update and expand the existing theoretical framework. Two prominent research directions have been proposed.

Direction 1: Investigating the Impact of the Metaverse and Web3 on Sustainable Brands

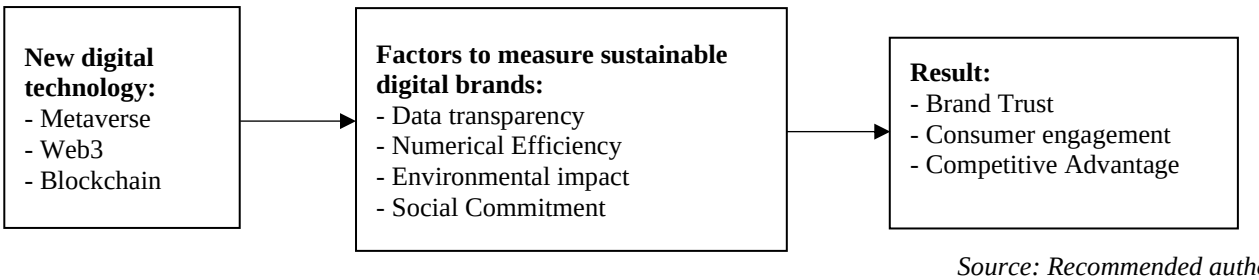
The advent of the metaverse and Web3 represents a pivotal shift in consumer-brand interactions, prompting inquiries into the integration of sustainability within this novel virtual space. Metaverse, conceptualized as an immersive digital environment offering multidimensional experiences, has the potential to serve as a branding platform for the future, where ESG values can be creatively and intuitively reproduced (Dwivedi et al., 2022). However, there remains a paucity of systematic research on how brands can effectively communicate sustainable messages within the metaverse as well as how consumers perceive the authenticity and ethics of brand activities in the decentralized environment of Web3. It is imperative to conduct comprehensive research on interoperability within the virtual world, transparency of user data, and role of blockchain technology in safeguarding sustainable brand value. Such research will not only assist businesses in designing more effective digital experiences but also expand the concept of brand social responsibility in this new era.

Direction 2: Developing a multi-dimensional scale for a sustainable digital brand

One of the notable deficiencies in the current research is the lack of quantitative instruments to thoroughly evaluate the efficacy of a sustainable digital brand. Existing studies predominantly focus on financial metrics or customer satisfaction indicators, whereas aspects such as digital transparency, environmental efficiency, and social impact are not

incorporated into a standardized framework. Consequently, the creation of a multidimensional scale for sustainable digital branding has emerged as a critical research direction, reflecting the integrated nature of this model. This scale should include the following dimensions: (1) digital performance, (2) data transparency and digital information governance, (3) the environmental impact of digital supply chains, and (4) social commitment as communicated through digital platforms. Geissdoerfer et al. (2017) highlighted the importance of evaluating the intersection between technological innovation and sustainable business models, whereas Dangelico and Vocalelli (2017) proposed theoretical frameworks for assessing green brands, yet these have not been extended to the digital context. Therefore, future research should concentrate on developing measurement models that are applicable to digital practices and highly relevant in the current business environment. The authors propose the following research model:

Model 1. Sustainable digital brand in the new technology era



Source: Recommended authors

5. CONCLUSION

This review systematically organized and analyzed research methodologies concerning sustainable branding in the digital era, categorizing them into three principal groups: digital branding, branding associated with sustainable development, and the brand-digital-sustainability integration model. Each group has significantly contributed to the theoretical framework and provides empirical evidence for contemporary brand strategies, particularly in the context of digital transformation and the increasingly pressing need for sustainable development (Baumgartner & Rauter, 2017; Mingione & Abratt, 2020; Keller, 2020).

A notable contribution of this study is its elucidation of the strong interconnection between digital technology and sustainable development strategies. This integration not only helps businesses enhance operational efficiency, personalize user experiences, and ensure supply chain transparency (Davenport et al., 2020; Tapscott, 2016), but also plays a pivotal role in establishing brand value based on trust, ethics, and social responsibility (Wamba et al., 2017). Digital sustainability" is identified as a strategic trend with significant potential for robust development in the forthcoming period (Geissdoerfer et al., 2017).

In terms of practical applications, this study indicates that businesses should incorporate Environmental, Social, and Governance (ESG) elements throughout the branding process, encompassing strategic positioning, product design, marketing communications, data governance, and digital customer interaction (Bharadwaj et al., 2013; Nielsen, 2019). Future successful brands will not only offer quality products but also demonstrate responsibility, transparency, and the ability to emotionally engage with the community through sustainable values (Edelman Trust Barometer, 2022).

Regarding content, the article synthesizes and analyzes academic works from 2015 to 2024, thereby elucidating primary research trends, unexplored academic gaps, and future theoretical development directions. Two notable research proposals are: (1) assessing the impact of metaverse/Web3 on sustainable brands (Dwivedi et al., 2022) and (2) developing multi-dimensional scales for sustainable digital brands (Dangelico & Vocalelli, 2017; Geissdoerfer et al., 2017). These are essential steps to update theoretical frameworks in response to rapid technological advancements and shifts in consumer behavior.

In summary, within the ever-evolving landscape of the economy and technology, establishing a sustainable brand on a digital platform is not merely an unavoidable necessity for businesses, but also a strategic opportunity to redefine the brand's role in contemporary society. Such a brand should not only represent products, but also embody progressive, equitable, and sustainable values.

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EXPLORING THE NECESSITY AND POTENTIAL OF PRECISION AGRICULTURE ADOPTION: A THEMATIC ANALYSIS OF STAKEHOLDERS' PERSPECTIVES IN VIETNAM

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ABSTRACT

Precision Agriculture (PA) offers transformative benefits for modern farming, particularly in digital smart farming, by enhancing resource efficiency and crop yields through advanced technologies. In Vietnam, where farming is vital to the national economy, understanding the necessity and potential for PA adoption is crucial to supporting sustainable agriculture. This study explores these aspects through qualitative data from semi-structured interviews with 35 participants, including 10 agricultural experts and 25 farmers, providing diverse stakeholder perspectives on PA adoption. The thematic analysis reveals that PA adoption is perceived as necessary to combat rising input costs, such as fertilizer, and mitigate low profitability issues. These challenges underscore the urgency for optimizing resource use to ensure farming viability. Additionally, findings suggest that the potential for PA adoption in Vietnam is driven by the return of younger generations to agriculture and a strategic shift within the agricultural sector towards commodity-oriented production. Together, these factors signal growing readiness for PA, supported by both social and economic shifts within rural communities. These insights contribute to the broader agenda of sustainable farming in Vietnam, offering evidence on how PA adoption is expected to address critical sector challenges. By highlighting both the necessity and potential for PA, this study provides valuable information for policymakers, technology providers, and agricultural stakeholders looking to foster resilient farming practices that align with Vietnam’s evolving agricultural landscape and global digital transformation trends.

Keywords: Precision agriculture, sustainable farming, digital farming

1. RESEARCH BACKGROUND

Rice cultivation is fundamental to Vietnam's agricultural economy, national food security, and the livelihoods of millions in rural areas. The Mekong Delta (MKD), often referred to as Vietnam's "rice basket," exemplifies this importance, producing over 55% of the nation's annual rice crop and 95% of its rice exports. This vast production system supports approximately 1.5 million small-scale rice farmers and impacts the lives of around 17 million people (WBCSD, 2023). Despite this significance, Vietnamese smallholder rice farmers face persistent and multifaceted challenges, including low production efficiency, escalating input costs, significant environmental degradation, and increasing vulnerability to the impacts of climate change (Tho, 2022; WBCSD, 2023). These issues threaten not only individual farmer livelihoods but also the sustainability of Vietnam's rice sector.

Vietnamese agriculture, particularly rice farming, suffers from resource overuse and inefficiency. Farmers heavily apply chemical fertilizers, with national consumption exceeding 10 million tons annually—two-thirds of which is devoted to rice cultivation (Nguyen et al., 2023). Studies highlight significant fertilizer overuse, reaching up to 155 kg/ha above optimal levels, resulting in approximately 30-40% waste (Tho, 2022; Nguyen et al., 2023). Similarly, despite government promotion of Integrated Pest Management (IPM), pesticide overuse persists, resulting in excess costs averaging 61 USD/ha (Tho, 2022; Nguyen et al., 2024). Additionally, traditional water-intensive irrigation and low adoption of advanced irrigation methods worsen inefficiency and greenhouse gas emissions (WBCSD, 2023; Nguyen et al., 2023). Excessive seed usage further contributes to resource waste, raising costs by approximately 28 USD/ha (Tho, 2022).

These inefficiencies lead to profound economic impacts on smallholder farmers, significantly lowering overall efficiency to about 59% and diminishing profitability (Tho, 2022). High input costs, notably fertilizers, pesticides, and seeds, substantially increase production expenses, thereby reducing net income (Tho, 2022; Nguyen et al., 2023).

Consequently, rice from the Mekong Delta struggles competitively, hindered by high production costs and lower product quality, limiting market opportunities and export potential due to strict chemical residue standards (WBCSD, 2023; Nguyen et al., 2024).

The sheer number of smallholders involved—with approximately 80% of the MKD population engaged in rice farming (WBCSD, 2023)—means any effective technological or managerial intervention must be tailored and accessible to this demographic to achieve meaningful national impact. Approaches aimed at large-scale, industrial agriculture risk overlooking most producers, limiting gains in rice output, food security, and rural stability. Consequently, the "smallholder" dimension is not merely a characteristic of the farming population but a critical parameter shaping the relevance and potential efficacy of agricultural innovations in Vietnam.

In response to these complex challenges, Precision Agriculture (PA) has emerged as an innovative farming management concept. PA offers the potential to address inefficiencies, enhance productivity, and promote sustainability within smallholder rice systems (Nguyen et al., 2023). The global pressures of a rapidly growing population demanding more food, coupled with the imperative to mitigate the negative environmental impacts of conventional agriculture (Monteiro and Santos, 2021; Nguyen et al., 2024), create an urgent need for transformative solutions. Traditional farming methods are increasingly insufficient to meet both productivity and sustainability goals simultaneously. PA, with its core tenet of producing "more with less" (Monteiro and Santos, 2021), presents a viable pathway for the necessary structural transformation in agriculture. This research background aims to define Precision Agriculture, delineate the current inefficiencies prevalent in Vietnamese smallholder rice farming, and subsequently argue for the necessity and explore the potential of PA adoption by these farmers.

Precision Agriculture (PA), also commonly referred to as precision farming or smart farming, is fundamentally a management strategy that leverages technology and data to optimize agricultural production. It is a data-driven approach that involves observing, measuring, and analyzing the needs of individual fields and even specific crop areas to inform management decisions (Monteiro and Santos, 2021). The International Society of Precision Agriculture (ISPA) defines PA as "a management strategy that gathers, processes, and analyzes temporal, spatial and individual data and combines it with other information to support management decisions according to estimated variability for improved resource use efficiency, productivity, quality, profitability and sustainability of agricultural production" (Yatribi, 2020). This approach applies advanced technologies and sophisticated data management techniques to monitor and manage aspects like crop health with a high degree of precision (Getahun et al., 2024; Monteiro and Santos, 2021).

Investigating agricultural stakeholders' (farmers and agricultural experts) perceptions regarding the necessity and potential for PA adoption is essential because successful implementation of new agricultural technologies fundamentally depends on stakeholder buy-in and acceptance. Farmers' willingness to adopt PA practices is influenced not only by the availability of technology but also by their beliefs about its practicality, economic benefits, and compatibility with existing practices. Agricultural experts, on the other hand, provide critical insights into feasibility, technical support needs, and policy implications (Nguyen et al., 2023). Hence, understanding both perspectives helps identify specific barriers, motivations, and conditions for adoption, ensuring that recommendations are locally grounded and support sustainable improvements in efficiency, profitability, and environmental outcomes in Vietnam. These motivates the authors to propose the following research objectives for this research.

- To explore smallholder rice farmers' views on the necessity and practicality of adopting PA to address current inefficiencies and environmental impacts
- To assess agricultural experts' views on the potential for PA technologies to enhance economic outcomes and environmental sustainability

2. RESEARCH METHODOLOGY

This study employed semi-structured interviews as the qualitative research method to explore Vietnamese stakeholders' perceptions of the necessity of and potential for precision agriculture adoption. Semi-structured interviews were selected due to their flexibility, allowing participants to elaborate on their thoughts while ensuring the key themes remained focused during discussions (Saunders et al., 2016). This method enabled deeper exploration of respondents' insights and uncovered unexpected views of the necessity and potential (Bell, Bryman, & Harley, 2018).

A purposive sampling strategy was adopted, including 35 participants—10 agricultural experts and 25 rice farmers. Experts were selected based on their extensive experience in agricultural innovation, rural development projects, and direct involvement with farmers. They represented Provincial Departments of Agriculture and Science and Technology, the Ministry of Agriculture and Rural Development, agricultural mechanization projects, and technology vendors. Their inclusion followed criteria such as involvement in at least five rural development projects, a minimum of ten years' experience working directly with farmers, and participation in two or more PA-focused conferences. Expert input followed principles of the Delphi approach, aiding in the initial formulation of the interview guide and triangulating subsequent findings.

Rice farmer participants were strategically selected from agricultural innovation conferences organized across Vietnam. Farmers met specific criteria: literacy, over five years of rice farming experience, a cultivation area of 0.5 to 2 hectares, and prior exposure to PA technologies. A stratified purposive sampling approach ensured geographic diversity and comprehensive insights representative of smallholder rice farmers nationwide (Patton, 2014). The interviews were conducted sequentially, beginning with expert consultations to establish preliminary themes, followed by farmer interviews guided by these insights. Farmers were identified and recruited with assistance from expert recommendations and sponsoring agricultural companies, facilitating effective participant engagement.

Each participant was assigned a specific code to ensure clarity, consistency, and anonymity in data analysis and reporting. This research categorized 35 interview participants into distinct groups based on their roles and regional contexts, including agricultural experts (AE01–AE04), technology developers (TD01–TD03), local authorities (LA01–LA03), and rice farmers from the South, Central, and North of Vietnam (FO01–FO25).

The thematic analysis followed six tailored phases to explore PA adoption's necessity and potential: (1) familiarizing with the data through transcripts and audio recordings to grasp initial perceptions; (2) coding relevant features linked to the need and potential of PA technologies; (3) identifying themes by grouping codes to uncover patterns in stakeholders' views on PA benefits, barriers, and conditions; (4) reviewing themes for coherence and accurate representation; (5) defining themes to capture conceptual nuances; and (6) drafting the analytical report, integrating narratives and data extracts to present a comprehensive picture of PA adoption in Vietnam.

3. RESULTS AND DISCUSSION

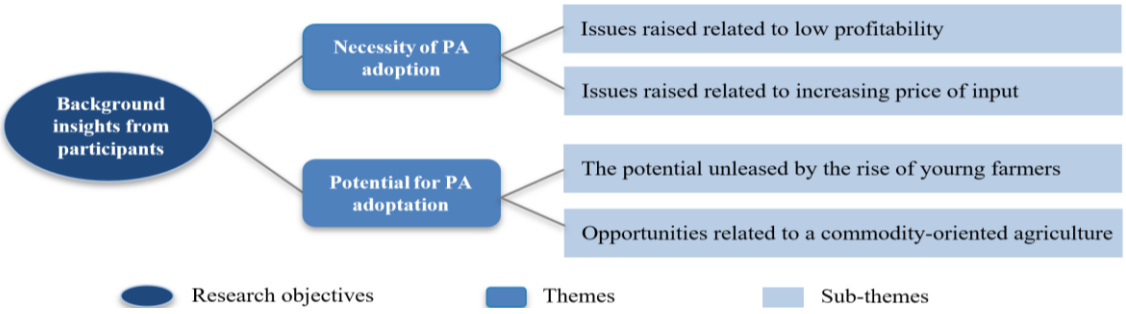


Figure 1. Thematic map of participant's general discussion

Source: Author's creation

Participants' general discussions highlighted two primary themes: the necessity of Precision Agriculture (PA) for Vietnamese smallholder rice farmers and its potential for adoption, as illustrated in the figure 1 below. In terms of necessity, the findings show that farmers viewed precision agriculture as vital for addressing the current challenges in rice farming. As for the potential adoption, there is a notable trend of young people returning to their hometowns in Vietnam to invest in agriculture, forming an innovative and technologically skilled workforce ready to adopt new technologies. Participants also provided insights into which specific types of PA technology should be prioritized and identified major obstacles that may prevent farmers from adopting PA technology.

3.1. The necessity of future PA adoption

The discussion among farmers and agricultural experts underscores the inevitability of adopting Precision Agriculture (PA) technology in Vietnam to modernize agricultural practices. The adoption of PA is seen as essential response to low profitability and increasing price of input, aligning with Vietnam's national strategy to develop a more structured and

professional agricultural sector to replace the outdated farming methods which associated with "spontaneity and fragmentation" (AE01, LAO03). This view dovetails with the highlights from Food and Fertilizer Technology Center for the Asian and Pacific Region by Do (2022), and also outlined in the Strategy for Sustainable Agriculture and Rural Development from 2021 to 2030 and vision toward 2050 under Decision No. 150/QD-TTg, which calls for restructuring toward digital and smart farming technologies. Moreover, both farmers and expert participants also agreed that Industry 4.0 will transform global agriculture, making PA implementation in Vietnam "only a matter of time" (FO03). One farmer encapsulates this sentiment:

"In this new era, it is essential to adopt advanced methods. Traditional farming practices will no longer be profitable. There's no denying that advanced technologies can offer numerous benefits at nearly every stage of farming." (FO07)

Underpinned by participants' insights, the drive to adopt PA comes from farmers' conviction that it could solve their current farming pain points. The table below summarizes the sub-themes that capture these emerging needs.

Table 1. Theme analysis of the necessity of PA adoption

Necessity	**Mentioned by no. of participants**
Issues raised related to low profitability	6
Issues raised related to increasing price of input	19

Source: Author's own research

3.1.1. Issues raised related to low profitability

The analysis of first sub-theme revealed that rice-growing areas are contracting as farmers struggle with low returns. An agricultural expert and five farmers noted that expanding cities, industrial parks, and more lucrative crops are encroaching on paddy land. As one expert put it, many farmers feel "depressed with the low income" from rice cultivation (AE01), prompting them to sell or convert their fields to aquaculture or fruit orchards for better profits (FO07, FO08, FO25).

"Facing shrinking farmland due to urbanization, farmers hesitate to invest significant sums in advanced agricultural technologies." (FO07)

"Our commune is losing rice fields to stadiums and offices, steadily decreasing land available for cultivation, leaving very little remaining." (FO08)

"The rice cultivation area is considerably diminishing because rice farming does not yield substantial profits for the local people." (FO25)

This declining rice production threatens both Vietnam's food security and its position as a top rice exporter (USDA 2020). "We cannot convince farmers to keep growing rice if it means staying poor," noted one expert (AE03). The solution lies in making rice farming profitable through innovation, ensuring farmers earn a "decent income" (LAO02) and "demonstrate how modernized farming improves livelihoods" (TD02). Before exploring how PA can boost incomes, it is essential to understand the factors eroding rice profitability in Vietnam.

In 2019, Vietnamese rice farmers earned just $100 monthly - 2.7 times less than Thai farmers and 1.5 times less than Indonesian counterparts. This stems from small farm sizes (0.5ha vs. profitable 2-3ha) and Vietnam's reliance on low-price rice marketing strategies that squeeze profits (Ho et al. 2022). Shifting to premium, value-added rice production is critical for improving farmer incomes.

This is where PA technology offers a targeted solution. By precisely regulating agrochemical applications, PA can minimize residues and help Vietnamese rice meet stringent international safety standards (Bukchin and Kerret 2020). Moreover, real-time monitoring and data collection enable product-traceability systems (FPT Digital 2022), boosting Vietnam's agricultural brand value for high-demand markets. With improved quality and market access, PA can raise farmer incomes, restore confidence in rice cultivation, and reduce land conversion pressures.

3.1.2. Issues raised related to increasing price of input

Furthermore, input costs have compelled rice farmers to improve agrochemical-use efficiency in order to protect profit margins. Based on interview findings, the researcher identified a second sub-theme, the urgent need to counter rising input costs, as a key driver for PA adoption among rice farmers. Cited by 19 participants, this concern outweighed

even the profitability issues. Farmers reported that soaring fertilizer prices are "major inhibitors" of their profit margins (FO04, FO19, FO23), creating a dilemma: reduce inputs, which leads to lower yields, or accept slimmer margins—both of which are unsustainable for rice farming and undermine the capacity to sustain or improve production. Farmers described the situation as follows:

"During the recent Covid-19 pandemic, agrochemical prices climbed sharply, with fertilizer costs rising nearly 2.5 times year-on-year." (FO10)

"Fertilizer and pesticide costs have soared while rice prices remain stagnant, demotivating farmers and pushing many to switch crops or abandon fields. (FO25)

This dilemma places farmers in a tough trade-off: applying sufficient agrochemicals reduces profits, while cutting inputs results in "a more severe issue of reduced rice yields" (FO22, FO25). Many farmers have "spontaneously reduced input use" without technical guidance, leading to undernourished crops and lower grain quality (TD01, LAO02). Although reducing agrochemical use is a desirable goal, one expert stressed the importance of doing so "in the right way" (AE02).

In Vietnam, agrochemicals account for approximately 40% of rice production costs (LAO03, TD02, AE03). Fertilizer price volatility, caused by rising input costs, supply chain disruptions due to sanctions on Belarus and Russia, and export bans from China, has led to a 134% increase in prices since early 2021 (Baffes & Koh, 2022; Hebebrand & Laborde, 2022). This trend is likely to persist, threatening farms and highlighting the need for "measures to reduce fertilizer use in rice farming" (LAO02). However, as noted earlier, unsupervised reductions in fertilizer use would not yield benefits. Studies indicate that 30-40% of fertilizer in Vietnamese rice farming is wasted, primarily through runoff (Truong et al., 2021), underscoring the urgent need to "regulate fertilizer waste without reducing yield" (TD02, AE04).

Precision Agriculture (PA) technology offers a promising solution by diagnosing plant-specific nutrient needs and delivering the exact amount required. This approach minimizes waste, reduces input costs, and helps sustain or even boost yields. One farmer, after observing PA technology in action with orange growers, noted:

"I have seen orange growers using PA standards significantly reduce chemical waste, save about VND 2.5 million per hectare per crop on input costs, and boost their yields by nearly 10% at the same time." (FO24)

Despite the broad consensus on PA's potential, adoption remains extremely low among rice farmers. None of the interviewed farmers had used PA in rice farming, and many had limited or incorrect understanding of the concept. Most associated PA solely with drones for spraying agrochemicals (FO04, FO06, FO12, FO13, FO20, FO22, FO23). However, as the literature clarifies, PA involves integrated technologies that diagnose crop needs and apply inputs accordingly, not just drone spraying (Barnes et al., 2019; Far & Moghaddam, 2018). These findings reveal critical gaps between PA's demonstrated benefits and its current implementation challenges in the sector. The next section examines its perceived potential in this context.

3.2. The potential for PA adoption

Vietnam's dynamic tech-startup ecosystem, abundant tech talent eager to collaborate with farmers, and growing digital transformation—even among smallholder growers—make it a strong candidate for Precision Agriculture development (Do, 2022). Recent data from FPT Digital (2022) indicates increasing interest in agricultural technology: 46% of smallholders recognize the potential of automation, 18% have adopted some digital tools, and 15% plan advanced practices. These findings reveal strong potential for PA adoption despite its low current uptake.

Beyond these structural enablers, two emerging trends further strengthen Vietnam's PA prospects: the return of young people to farming and the agricultural sector's shift toward commodity-oriented production. This study explores these two sub-themes in depth, correlating participants' insights with industry reports to show how youthful labor engagement and market-driven crop strategies together create fertile ground for PA uptake.

Table 2. Theme analysis of the potential for PA adoption

Potential	**Mentioned by no. of participants**
The potential unleashed by the rise of young farmers	15
Opportunities related to a commodity-oriented agriculture	8

Source: Author's own research

3.2.1. The potential unleashed by the rise of young farmers

15 over 25 farmer participants observed a youth-led revitalization of Vietnam's agricultural workforce. This trend involves educated young people "returning from urban centers with capital" and bringing innovative approaches to farming (FO13, FO15, FO16). These new-generation farmers are driving modernization by "merging small farms into larger plots" (AE02), "adopting modern farming for premium markets" (FO23), and "creating value-added production" (FO01, FO22, FO25). As one participant expressed:

"Like many graduates in recent years, I left Ho Chi Minh City to advance Vietnam's agriculture, not to retreat from modern life, but to transform it." (FO16)

Young educated farmers show greater potential for PA adoption due to their higher technological awareness and willingness to take risks. They possess "broader knowledge" (FO04) and are more "diligent in learning and accepting new things" (FO10), which enhances their understanding of advanced technologies. Their "adventurous" mindset (TD01) also makes them more open to embracing "new challenges" (TD02), in contrast to older farmers who "often hesitate" (FO18) toward adopting new technologies.

"Younger farmers tend to adopt PA technologies, while older farmers often hold a more traditional outlook and are less open to new innovations." (FO10)

3.2.2. Opportunities related to a commodity-oriented agriculture

PA adoption is further supported by the government's push toward commodity-oriented agriculture, as Vietnam shifts away from 'small-scale, self-sufficient farming' (FO13, FO03) toward large-scale, high-quality production aimed at positioning its agricultural products as nationally competitive assets (FPT Digital, 2022; Nguyen et al., 2022). Participants noted that PA adoption becomes more feasible as rice farming becomes more "professional" (AE01, FO17) and aligned with "commodity-based production" (FO14, LAO02). As one participant explained:

"PA and advanced technologies will gain acceptance once Vietnam's farming shifts from scattered to consolidated, commodity-oriented operations." (FO18)

Commodity-oriented agriculture emphasizes large-scale production with defined standards and quality control, aiming not only to ensure food security but also to compete in export markets (Samarets & Nuzhna, 2019). Recognizing the need for scale, the government has introduced policies to promote land consolidation while prioritizing digital transformation in agriculture, thereby creating new opportunities for farmers under strong policy support (Zhang et al., 2022).

Large corporations have also shown interest in supporting farmers financially to adopt advanced technologies. Several participants noted being approached by companies offering collaboration to modernize farming (FO01, FO03, FO09). Such partnerships may enhance farmers' confidence in embracing change. One participant shared:

"When collaborating to bring about changes, we farmers place more trust in private companies than in the state." (FO14)

In summary, the return of young farmers and combined government-private support for commodity-oriented agriculture create strong PA adoption potential. To explore this further, 25 farmers were asked which PA technologies they believe are most likely to be adopted in the near future. According to their responses, the greatest interest is in variable rate technology (56%), followed by precise plot preparation (24%) and unmanned vehicles (drones and automated tractor) (20%). This reflects a growing desire to reduce excessive fertilizer and pesticide use, which has contributed to environmental pollution over the past three decades. By enabling more accurate input application, variable rate systems offer the dual benefits of cost savings and reduced ecological impact.

Despite this strong perceived potential, smallholder rice farmers in Vietnam face substantial barriers to adoption, keeping actual uptake rates low. When surveyed, most cited high initial costs as the primary obstacle, followed by technical complexity and hesitancy to adopt unfamiliar methods. Agricultural experts highlighted the following concerns:

"Although farmers recognize the advantages of precision agriculture, the upfront investment remains prohibitively high for small-scale farms." (AE02)

"While promising, the technology's effectiveness is limited by farmers' lack of knowledge and training, requiring

more support and education."(AE03)

To conclude the above analysis, while the necessity and benefits of PA are widely acknowledged, its adoption among Vietnamese rice farmers is likely to remain limited unless financial, technical, and behavioral barriers are effectively addressed. The below figure visually summarizes our findings and the relationships among components.

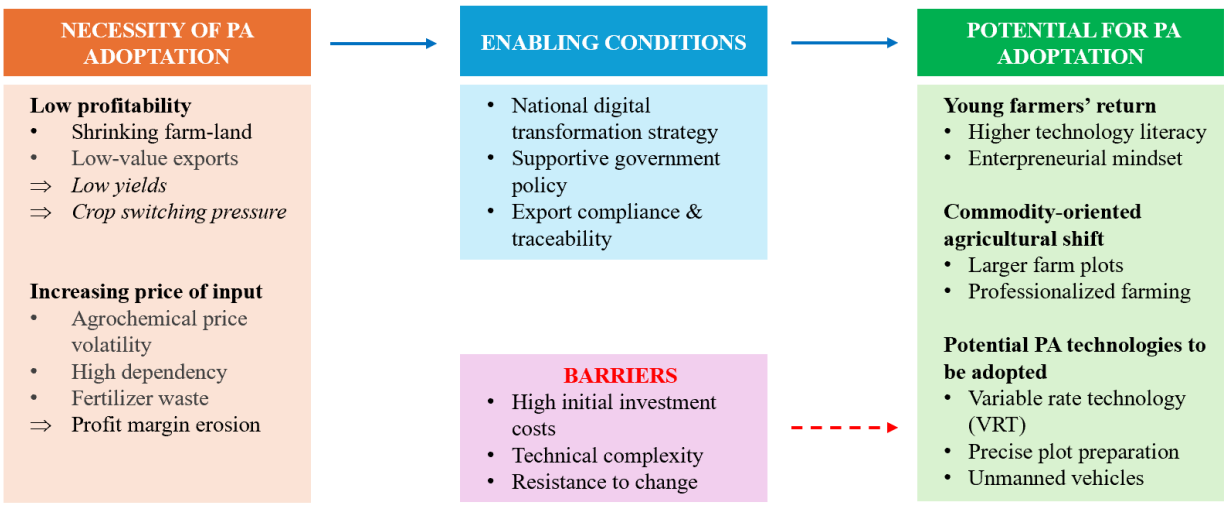


Figure 2. Thematic map of drivers and conditions for PA adoption in Vietnam

Source: Author's creation

3.3. Adoption of Precision Agriculture: Regional and Global Comparisons

Precision agriculture adoption across Asia reflects shared ambitions and challenges. Developing countries—including Vietnam, Thailand, Indonesia, India, and China—aim to reduce input costs, boost productivity, and enhance sustainability. However, persistent barriers such as insufficient digital infrastructure, technical skill gaps, and high technology investment costs hinder progress. Regional strategies differ: Indonesia promotes digital literacy and public–private partnerships; India supports interdisciplinary pilot projects; and China invests in rural internet infrastructure and value chain integration (Balingbing et al., 2022; Herdiansyah et al., 2023; Rimpika et al., 2023; Shen et al., 2022). In developed regions such as the United States and European Union, PA adoption is largely driven by regulatory requirements, environmental goals, and operational efficiency on large farms, supported by advanced infrastructure and mature technology markets that offset barriers like high capital costs and data governance issues (Júnior et al., 2024; Barnes et al., 2019). While developing countries emphasize foundational capacity-building, developed nations focus on advanced systems integration and interoperability. For Vietnam, selectively adapting successful elements from both regional and international approaches, while aligning with its smallholder structure, emerging digital ecosystem, and growing youth engagement, could accelerate effective PA adoption.

5. CONCLUSION

This study highlights the potential for Precision Agriculture adoption among Vietnamese smallholder rice farmers, driven by low profitability and high input costs. While tech-savvy youth and government initiatives support adoption, barriers like high costs, limited knowledge, and resistance remain. To overcome these, policymakers should offer financial incentives and training to build skills and confidence, while also leveraging returning youth's digital expertise and aligning with national digital strategies to ensure sustainable adoption.

A key limitation of this research lies in its qualitative design, which, while rich in depth and contextual understanding, limits generalizability across Vietnam's broader farming population. Future research could benefit from a mixed-methods approach and larger sample to validate and expand these insights. Furthermore, future research should examine scalable financing models (e.g., cooperatives, subsidies, leasing), the role of public-private partnerships in technology diffusion, and tailored extension services. Longitudinal studies are also needed to assess PA's long-term socio-economic and environmental impacts in diverse Vietnamese farming contexts.

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LEXICAL INNOVATION IN SUSTAINABILITY EDUCATION: A CORPUS-BASED STUDY OF SUSTAINABLE DEVELOPMENT GOAL VOCABULARY IN ENGLISH TEXTBOOKS

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ABSTRACT

The increased attention on sustainability within international education systems has led to the incorporation of Sustainable Development Goal (SDG)-related lexis within English language textbooks. This research conducts a thorough, corpus-based analysis of innovative lexical aspects within sustainability pedagogy, relying on a manually formed corpus of English textbooks synthesized between 2010 and 2023. Combined with qualitative and quantitative corpus-linguistic approaches, it reveals the direction of emerging trends in vocabulary use, semantic reorientation of SDG (Sustainable Development Goals) collocates, and changing collocational patterns. Results indicate a sharp upward trend in the use of such sustainability vocabulary, reflecting the amplified role that United Nations' SDGs now play in regional and national discourses on education. The study also holds out some pedagogical promise by urging textbook writers and teachers to adopt a sensitive and balanced approach to the introduction of vocabulary that relates to the SD in the textbooks intended to develop sustainable literacy amongst students. Providing empirical evidence on how lexicon innovation reshapes discourses of sustainability in educational material, it adds fruitful input to the intersecting interdisciplinary debate involving language, education, and development.

Keywords: corpus linguistics, lexical innovation, SDG vocabulary, sustainability education, semantic shift

1. INTRODUCTION

The adoption of the United Nations' 2030 Agenda has reshaped education worldwide, positioning it as vital in preparing learners with the skills and values needed for a sustainable future (United Nations, 2015). Central to this shift is the integration of the Sustainable Development Goals (SDGs), particularly Target 4.7 of Quality Education (SDG 4), which emphasizes Education for Sustainable Development (ESD) and global citizenship (UNESCO, 2017).

In this context, English language education serves as a key channel for sustainability discourse, especially in non-native English-speaking regions where English functions as a global medium (Baker, 2015). English textbooks, widely used across diverse contexts, play a crucial role in embedding sustainability concepts and shaping learners' understanding of global issues (Gray, 2010; Weninger & Kiss, 2013).

Lexical innovation is central to how these concepts appear in educational texts, as new terms like climate justice and net zero reflect evolving environmental and social discourses (Aitchison, 2012; Mair, 2020). While critical textbook studies (e.g., Gray, 2010; Weninger & Kiss, 2013) have highlighted cultural and ideological narratives, few focus specifically on sustainability vocabulary or use corpus methods.

Jickling and Wals (2008) criticized ESD's lack of critical depth, yet their work did not examine textbook language. Garnett and Christodoulou (2022) used corpus analysis to reveal SDG imbalances in UK geography textbooks, with limited attention to social justice goals. Leemans and Van Hout (2019) traced lexical shifts in EU climate discourse but did not link these to educational texts. Similarly, Hyland and Jiang (2021) explored academic lexical bundles but not sustainability terms in school-level materials.

Previous research has provided valuable insights into textbook discourse on Education for Sustainable Development and ideological representation. However, there are significant gaps in the literature. One such lacuna pertains to the word-formation processes of sustainability, specifically the lexicon of the Sustainable Development Goals, which terms have not been adequately explored in English Language Teaching or in textbooks from other disciplines. Moreover, the majority of them have not dealt with lexical innovation since the existing works have mainly focused on the mere existence or non-existence of sustainability topics. The few that have examined related terms have not considered how

their meanings and collocational patterns have since developed. Finally, while corpus linguistics has found prominence in research on policy discourse and academic writing, it has not spilled over into long-term textbook analysis, particularly in tracing diachronic lexical trends in sustainability education.

This study bridges both these gaps by undertaking a corpus-based, diachronic study of sustainability-related vocabulary in 50 English textbooks published from 2010 to 2023. It will be seen how terms related to the SDGs have been taken up, had their meanings altered, and been rhetorically framed within the discourses of education. Changes in frequency, the patterning of use, and semantic collocate words, the paper purports, detail how textbooks help build the concept of students' understanding of sustainability. Findings are expected to have relevance for applied linguistics, textbook research, and sustainability education and accordingly a critical pedagogical role for textbooks in reflecting and mediating global discourses on sustainability.

The study will operate based on three main questions. It will be interesting to learn how the frequency and distribution of SDG-related vocabulary has altered across a time span from 2010 to 2023. The second question that guides the study seeks the semantic and collocational shifts in the use of terms related to sustainability. The third question highlights the pedagogical implications of the lexical change for sustainability education. Drawing upon a methodology of the corpus-based study, this paper is expected to create a new avenue for understanding how textbooks both reflect and construct sustainability discourse, thereby creating a bridge between linguistic form and educational function.

2. THEORETICAL FRAMEWORK

2.1. Lexical innovation and language change

Lexical innovation results in the creation of new words or reinterpreting the meaning of words because of social, technological, or ideological changes (Aitchison, 2012; Brinton & Traugott, 2005). There is the trend of compounding (carbon-neutral), affixation (eco-friendly), blending (glocal), and borrowing (e.g., resilience) words to reflect larger cultural shifts (Crystal, 2019).

Terms in sustainability discourse, such as greenwashing and climate justice put big issues in small words. Leal Filho et al. (2020) say the words about sustainability are not just getting more but also growing in ideological weight, often embedding value or policy meanings.

Following what Fairclough (1992) said about words as a social practice, these word changes show struggles, for example, between sustainable growth and degrowth. Corpus linguistics enables researchers to track such trends, analyzing patterns of frequency, collocation, and meaning (Baker et al., 2006). Though applied in areas like political and media discourse (Baker et al., 2008; Bednarek, 2018), its use in sustainability education, especially textbook analysis, remains limited.

2.2. The role of textbooks in sustainability education

Textbooks are at the heart of formal education, laden with information and ideology in highly curricularized contexts (Weninger, 2022). In vocabulary teaching within the normativity perspective of sustainability is the good way, accentuating some issues, leaving the rest in shadow. Omission of terms such as "climate justice" or "living wage" can confine the students to handle the problem technically, neglecting its social and ethical dimension. Such research imbalances are clearly evidenced, for example, overemphasizing the environmental goals of SDG 13 and underemphasizing the social goals of SDG 10 or 16.

The United Nations' 2030 Agenda has done much to promote shared global sustainability lexicology; terms such as "no poverty" and "gender equality" feature prominently in education and policy today (UNESCO, 2017; Pineda, 2020). While this ensures coherence, there is the danger that, in the final analysis, the most complex problems will come to be treated in terms of mere buzzwords (Moro, 2021). For example, the term "climate-resilient infrastructure" is generally used without unpacking its meaning. That is a task of textbooks, and many among these continue to give priority to less sensitive environmental goals over the social or political complexities of, say, SDG 5 or 16 (Kopnina, 2020). For ESD to be truly transformative, it must reflect the entire discourse pertaining to the range of SDGs, and not just the "safe" elements.

2.3. Corpus design and data collection

This study compiled a specialized corpus of 50 English-language textbooks published between 2010 and 2023 to examine lexical innovation in sustainability education. Covering both pre- and post-2015 (the adoption year of the SDGs), the corpus includes materials from secondary and tertiary levels, primarily from major English-medium publishers such as Cambridge, Pearson, and Oxford.

Textbooks were selected based on the presence of explicit sustainability content such as chapters on environmental issues, global development, citizenship, or SDGs to ensure contextual and pedagogical relevance (Weninger, 2022; Apple, 2004). Only materials officially adopted in national or institutional curricula were included, following Gray's (2010) recommendation to focus on classroom-impacting resources.

The final corpus contained approximately 5 million words, with non-linguistic elements removed and files converted to plain text. This size allowed for robust quantitative analysis while remaining suitable for qualitative interpretation (Baker et al., 2006).

2.4. Corpus tools and processing

Two tools that supported each other were used to analyze the body of text in this research. AntConc (Anthony, 2022) was used to carry out basic jobs of preparing the text for analysis, such as simple counting of how often words occur, KWIC concordances, and n-gram analysis. This first tool made it possible to look at general l patterns and their variations across the dataset. Sketch Engine (Kilgarriff et al., 2014) was used for more sophisticated linguistic analysis. It could look at deeper collocational structures and semantic prosody as well as carry out statistical keyword extraction based on strong measures like MI or LogDice. All such tools together create a pretty solid base for scrutinizing word trends and meaning links within the body of text.

All texts were POS-tagged using TreeTagger to standardize word classes across tools and allow accurate parsing of noun phrases, verb-object combinations, and prepositional structures relevant to sustainability discourse (e.g., transition to clean energy).

3. ANALYTICAL FRAMEWORK

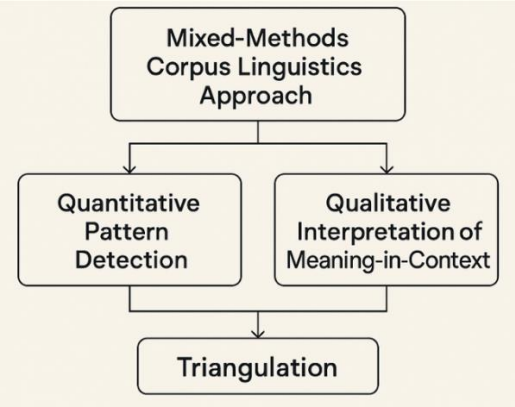


Figure 1. Mixed-Methods Corpus Linguistics Framework Integrating Quantitative and Qualitative Discourse Analysis

This study employs a mixed-methods corpus linguistics approach, combining the strengths of quantitative pattern detection with qualitative interpretation of meaning-in-context. This triangulated design addresses calls from Baker et al. (2008) and Fairclough (2003) to treat language not only as data but also as discourse embedded in power structures and social practices.

3.1. Quantitative Frequency Analysis

Lexical frequency was calculated for a predefined list of 65 SDG-related terms, normalized to per-million-word frequency. The frequency of these items was compared across two time periods:

– *Pre-SDG adoption (2010–2015)*

– *Post-SDG implementation (2016–2023)*

This diachronic comparison allows for tracking how the visibility and prioritization of sustainability concepts evolved in educational discourse following the UN's Agenda 2030.

3.2. Collocational Analysis

The study examined collocational patterns of important concepts like sustainable development, climate change, and gender equality noting key collocates (MI ≥ 3) to see changes in language framing. For instance, where 'sustainable development' was first linked with the growth of production, subsequent textbooks included it more with the growth of output targets thus showing a change in conceptual priorities.

This study illustrates how textbooks can support or question popular stories about keeping things the same (Tannen, 1993; Wodak, 2015), giving a better look at the big picture of ideas that go along with talking about education.

3.3. Qualitative Semantic and Discourse Analysis

Concordance lines of high-occurring terms and new terms such as net zero, just transition, and blue economy will be viewed with Fairclough's (2003) Critical Discourse Analysis (CDA) framework to show how such vocabulary fits in or is fleshed out within textbook discourse—in aspirational narratives, policy talk, or problem–solution setup.

Words used to hide beliefs and teaching goals will also be checked, including comparisons (e.g., footprint, transition) and helping words (e.g., should decrease emissions, must protect biodiversity).

3.4. Keyword Selection and Thematic Coding

The keyword list was developed from two key sources: the United Nations' 2030 Agenda (United Nations, 2015) and UNESCO's ESD Learning Objectives (UNESCO, 2017). Keywords were grouped into three thematic categories. Goal Titles include the official SDG names, such as Climate Action (SDG 13) and Gender Equality (SDG 5). Target Descriptors are phrases from specific SDG targets, like inclusive education, renewable energy, and sustainable cities. Thematic Indicators consist of widely used terms such as carbon footprint, green infrastructure, and circular economy, selected for their conceptual and pedagogical relevance. This structured categorization supported the analysis of how sustainability vocabulary is embedded in textbook discourse.

The list was then refined using Sketch Engine, based on frequency and dispersion analysis. High-frequency emergent terms not in the original list such as eco-friendly, net zero, greenwashing, just transition, and blue economy were added, reflecting the growing complexity of sustainability discourse in post-2015 textbooks.

The final list thus reflects a hybrid method: combining policy-based vocabulary with corpus-informed trends, balancing institutional alignment with educational relevance.

4. FINDINGS

This section presents the results of a corpus-based study of 50 English-language textbooks published between 2010 and 2023, representing approximately 5 million words. The corpus was split into periods of time before and after the implementation of the SDGs, specifically from 2010 to 2015 and 2016 to 2023. This enabled a diachronic trend analysis of how the integration of SDG-related words had evolved. Trends, therefore, fall along three dimensions: how often such words were used, changes in meaning and collocation, and the coverage as well as emphasis of the SDGs in the textbooks.

4.1. Lexical Frequency Trends

A sharp increase was noted in the use of SDG-related vocabulary after 2015, corresponding to when these agendas were adopted institutionally. Most prominent words expressing this concept were sustainability, climate change, renewable energy, gender equality, and circular economy which saw a rising trend in their use.

Table 1. Frequency of Key SDG-Related Terms in English Textbooks (2010–2023)

Term	2010–2015	2016–2023	Growth Rate
Sustainability	3,450	12,450	+260%
Climate change	2,780	9,780	+252%
Renewable energy	1,210	6,210	+413%
Gender equality	890	4,560	+412%
Circular economy	120	1,890	+1,475%

As shown in Table 1 and Figure 1, the term *sustainability* rose from 3,450 mentions pre-2015 to 12,450 post-2015, a 260% increase, marking its shift from a peripheral term to a core educational concept. Even more impressive, circular economy grew from just 120 to 1,890 times, showing a 1,475% increase and indicating the introduction of new economic ideas into book talk.

Post-2015 neologisms, such as eco-friendly net-zero blue-economy just-transition, etc. Terms which indicate a shift from the individual behavioral framing (e.g. recycling) to more fully-fledged systemic justice-oriented discourse. For instance, just transition brings in labor rights and equity which can be aligned with the global policy and climate justice debates (Newell & Mulvaney, 2013).

This linguistic growth shows more than increase—it shows a speaking change. Books more and more describe sustainability as a difficult, multi-faceted problem concerning the economy, politics, and social justice. By doing this, they work not just as teaching aids but as messengers of international values, influencing how students think about and address issues relating to sustainability.

2. Semantic and Collocational Shifts

The second level of analysis checked semantic changes and grouping patterns of key SDG words. Results show that post-2015 books introduce sustainability-linked lexicon in increasingly specific, policy-based settings.

Generic to Specific Usage

Prior to 2015, terms such as sustainability and sustainable development were used in generic descriptions, often isolated from global frameworks (e.g., "achieving sustainability in our community"). In contrast, post-2015 occurrences often included explicit references to SDGs, e.g., "SDG 12: Responsible Consumption and Production" or "as stated in the 2030 Agenda."

4.2. Collocational Reframing

Table 2. Collocational Shift of Selected Terms (2010–2015 vs. 2016–2023)

Term	Top Collocates (2010–2015)	Top Collocates (2016–2023)
Sustainable development	economic growth, infrastructure	SDG, global goals, social inclusion
Gender equality	women, access	empowerment, leadership, SDG 5
Renewable energy	sources, electricity	innovation, net zero, global transition

The findings show a obvious change in sustainability language. Earlier books mostly set sustainable development next to economic growth or infrastructure, showing a technocratic theme. But after 2015, collocation trends describe wider links with social fairness, global rules, environmental strength, and intergenerational justice, which relate to the SDGs' whole idea (UNESCO, 2017).

Concordance analysis also reveals a rhetorical shift. While the earlier editions used factual, definitional sentences (for example, "Renewable energy is…"), the newer editions use conceptions with more verve and dynamism (for example, "We must accelerate the transition…"). This reflects a move in pedagogy from passive to more active forms of learning, which might prompt students to consider sustainability as a significant part of individual as well as global welfare (Sterling, 2016).

This shift from mere factual delivery to prescriptive, performative verbiage marks the advent of a prescriptive sustainability discourse. Books at present do not only try to inform but to inspire learners—forming ethical awareness, critical thinking, and the capacity to build a sustainable future.

4. SDG COVERAGE AND THEMATIC BALANCE

To examine which SDGs are most represented in textbooks, this study categorized and quantified SDG-related vocabulary across the post-2015 corpus. The analysis revealed a clear thematic imbalance, heavily favoring environmental goals.

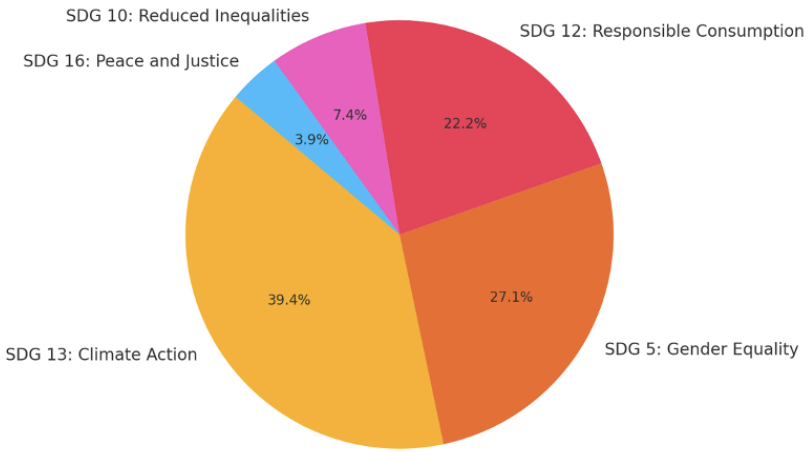


Figure 2. Distribution of SDG-Related Vocabulary in Post-2015 Textbooks

As shown in the chart, SDG 13: Climate Action takes over most of the textbook content, making up almost 40% of all SDG-related word use. This involves a lot of talk on climate change, carbon footprint, and global warming. The other two that stand right next to them are SDG 5: Gender Equality and SDG 12: Responsible Consumption, with the former having 27.1% and the latter having 22.2%.

On the contrary, while SDG 10: Reduced Inequalities stood at 7.4%, and SDG 16: Peace and Justice was at 3.9%, underrepresentation was significant. Terms key to them such as social equity, and inclusive governance and peacebuilding were rare or completely absent from most textbooks.

This focus on ecological sustainability alone, and not the equal justice of the social system and institutional aims, frames the concept of sustainable development in a very narrow way pedagogically. These results support previous observations by Garnett and Christodoulou, as well as by Kopnina, regarding the dangers of permitting 'greenwashing' pedagogical plans, which permits overly politically skewed or structurally contentious material to come into sustainability education, defined to be environmentally biased with limited attention to social justice, inequity, and institutional aspects. In such courses, students are likely to define their concept of sustainability as a strictly environmental concern, rather than the UN definition's three-pillared concept.

Moreover, a lot of books put keeping content in by itself topic groups (for example, one chapter on “The Environment”), instead of mixing sustainability terms throughout subjects like economics, civics, or health. This teaching separation might cut chances for students to grasp sustainability as a crosscutting, complete framework.

The corpus analysis offers several key insights relevant to textbook development, pedagogical practice, and the broader direction of sustainability education.

The first major finding is the word stock of textbooks relative to global policy agendas. There has been a marked rise in SDG-saturated vocabulary after 2015, which is the general timing of the spread of the 2030 Agenda into English-language educational material. This trend places students at best, passively or, at worst, actively as interpreters of international policy language embedded in the textbooks.

The second insight highlights word creation as a form of teaching change. The use of words like fair change and net zero in later than 2015 books shows more awareness of new world talks. This shows that books are changing files that show what is going on around the world, rather than set sources of known facts.

Third, the data show a change of meaning in the sustainability talk. Word patterns have switched from a focus on money growth to topics like social sharing, expanding how sustainability is thought of. This move makes space for better class focus on issues of fairness, taking part, and justice, making the change possible of sustainability education more effective.

Fourth, the study also found an unequal balance in the representation of the SDGs, where environmental goals still receive more weight than those of peace, equality, and governance (such as SDGs 10 and 16). This proves that curricular

blind spots are evident. To develop textbooks that will have the content to deliver balanced and comprehensive knowledge on all 17 goals, as emphasized in SDG Target 4.7 (UNESCO, 2017), future textbooks must remove these spots.

Finally, it is found that verily the role of language does form the thinking of sustainability. The words used in the books influence how students perceive and respond to the issues on sustainability. Such choices are not ideologically neutral but, instead, act as framing devices which form the understanding of the students with regard to the development sustainable plus their imagined roles in creating a more equitable future.

5. DISCUSSION

This corpus-based study shows important word growth and changes in how SDG-related concepts are shown in English books. Following ways in sustainability pedagogy (Braßler and Schultze, 2021), the more SDG word after 2015 is clear not just in amount but also in meaning depth.

Circular economy, just transition, and net zero are newly emerging terms, reflecting the influence of global policy and evolving frameworks of sustainability. However, integration of these terms in textbooks has remained uneven. The language of sustainability has moved from the economics of development to wider social equity and governance at all levels, fitting the emphasis of recent pedagogy approaches on an interdisciplinary focus. Although progress has been made in these changes, transformation in the curricula and topic treatment in isolation serves to perpetuate constraints in the potential for transformative sustainability education.

Lexical Expansion and Discourse Evolution

SDG-related themes such as sustainability, climate change, gender equality, and circular economy were only at the margins of the discussion on education and development. Yet, as in many other areas they have since become the main referents for any textbook unit, marking a major shift in the terminology toward sustainability as per the 2030 Agenda.

If new global stories on sustainability that come from policy, research, and society after 2015 are to be used in textbooks, then phrases like net-zero, just transition, and blue economy must go. As Leal Filho et al. (2020) argue, this reflects the convergence of education and sustainability governance, with textbooks acting as vehicles of normative discourse.

The vocabulary has also grown to words on economic and social parts—energy fairness, growth for everyone, equity between generations— showing a more mixed way. But without enough teaching help, this word can stay vague. Teachers have to help by fitting words and encouraging deep thinking to make green education both real and easy.

Semantic Reframing and Pedagogical Shift

This study shows the change in the language of sustainability, from neutral definitions to very strong imperative and action-oriented terms. For example, the old textbooks used to say "Renewable energy is energy from natural sources," while the post-2015 materials more and more urge the students to "reduce emissions" or "contribute to SDG 12" which shows a focus on learner agency and active participation (UNESCO, 2017).

This change in words fits the goals of SDG Target 4.7 and the ideas of Education for Sustainable Development, which highlight the growth of values and action competence. It also shows a move in talk from just giving facts to making a statement, often using helping verbs and hopeful words to encourage others (Fairclough, 2003).

However, as Braßler and Schultze (2021) and Sterling (2016) noted, such shifts deliver no more than what may be termed surface activism if not underpinned by critical reflection: To make full use of the educational potential this language carries, educators have to promote amongst learners the critical literacy of sustainability by guiding them on how to see, question, and connect their actions with broader systemic and ethical issues.

Thematic Imbalance and Structural Silences

Although sustainability vocabulary is increasingly visible in English textbooks, this study reveals a clear imbalance. Environmental goals, particularly SDG 13 (Climate Action), dominate, while social and institutional goals like SDG 10 (Reduced Inequalities) and SDG 16 (Peace and Justice) are often underrepresented and presented in vague, depoliticized ways.

This reflects a discourse that prioritizes ecological issues over structural concerns. As Kopnina (2020) notes,

sustainability education often promotes a "green orthodoxy" that sidelines critical discussions of power and inequality. Garnett and Christodoulou (2022) similarly highlight the absence of social justice narratives in mainstream materials.

These gaps risk framing sustainability as a set of individual actions rather than a systemic issue. To support the goals of Education for Sustainable Development (Wals and Benavot, 2017; UNESCO, 2017), textbooks must address justice, participation, and critical reflection to help learners become informed and engaged global citizens.

Pedagogical Implications

This study emphasizes an urgent need for a more balanced, critical approach to sustainability education. Though increased vocabulary on SDG in English- language textbooks points to growing resonance with the fronts, in actuality, the content remains largely skewed toward problems related to the environment and individual behavior. Such scant framing does not bring out the ethical, political, and systemic aspects without which sustainability cannot be understood in its totality.

Educators must be viewed as playing a central role in filtering the discourse of sustainability. Therefore, they should be active agents, not passive transmitters of information. The competence of teacher training courses in the field of sustainability literacy and critical language analysis and social justice education would enable the teachers to spot such distorted discourses. These goals, specifically Inequalities (SDG 10), Peace and Justice (SDG 16), and Decent Work (SDG 8), are not represented, although they are relevant in terms of structural obstacles relating to sustainable development. Students need to be provided with information on how to question the silences that leave out specific voices and perspectives in textbook narratives for critical consciousness to be nurtured (Fairclough, 2003; Weninger, 2022).

An equally varied pedagogical approach is critical. Linking environmental issues with the wider aspects of social inequity and economic injustice inspires students to see sustainability as a multi-dimensional field rife with conflict, and does not leave blurry spots. Even better, such teaching strategies as class discussions and role-play or project-based work that involves the students themselves in the learning process and makes them take different ethical standpoints can be gleaned from sustainability problems (UNESCO, 2017; Bamber et al., 2012018).

In the end, it is up to the authors of textbooks and the designers of curricula to share a large responsibility for the sustainability narrative. It is important that they undertake a critical review to see if educational materials are used to encourage only superficial behavioral actions or actually engage in the more profound structural issues of extractive industries and global energy injustice. To achieve transformation goals as set out in SDG Target 4.7, the education on sustainability should enable the learners to act proactively — to be able to think critically, reflect ethically, and take meaningful participation in the establishment of a more just and sustainable future.

Limitations and Future Research

While this study offers a longitudinal analysis of SDG-related vocabulary in 50 English-language textbooks, several limitations point to directions for future research.

First, the corpus is confined to English-language textbooks from largely Western publishers. These materials, though globally influential, do not capture the cultural and linguistic diversity of sustainability education in non-Western or Indigenous contexts. Future research should adopt a comparative, multilingual lens to examine how sustainability is framed in other languages and local epistemologies.

Second, this study analyzes written content but not classroom implementation. It does not reflect how sustainability discourse is taught, interpreted, or resisted in practice. Combining corpus analysis with ethnographic methods—like observations or interviews—could offer richer insights into pedagogical enactment (van Lier, 2004; Canagarajah, 2005).

Third, the focus on print textbooks overlooks the growing influence of digital learning tools. Future studies should explore how sustainability discourse is presented, simplified, or commercialized in apps, online platforms, and OER.

Lastly, while centered on vocabulary, this study does not examine narrative structures or ideological framings. Future research could analyze how students are positioned—as passive consumers or active changemakers—and investigate dominant metaphors or value-laden narratives through critical or multimodal discourse analysis.

This research mapped the lexical shifts of sustainability-linked terms in English-language textbook discourse, demonstrating how educational language reflects global frameworks such as the United Nations' 2030 Agenda. The data

revealed both an increase in usage and a shift in the meanings of SDG-related terms, particularly after 2015, with expressions such as circular economy, net zero, and just transition indicating deeper conceptual engagement.

Textbooks are major discursive tools that pass global agendas to learners. The increase in SDG words shows a change in where the curricula is going, but also shows how the social and institutional goals are left out, like SDG 10 and SDG 16. This reveals thematic imbalances that hinder the realization of comprehensive and holistic sustainability education.

The change in sustainability education speaks to the action-oriented language within the purview of the transformative learning objectives. Without the critical literacy and reflective pedagogy, however, such change would bear little fruit and instead result in a mere lip service. To fully accomplish the redefined goals of Education for Sustainable Development, content-wise breakthrough efforts of educators must be directed toward ensuring that all 17 Sustainable Development Goals are meaningfully articulated in educational content. Equally important is the promotion of critical language awareness that would enable the learners to question the language of sustainability discourse and the values, assumptions, and power it conveys. There must also be an interdisciplinary method that includes linguistic representation in sustainability with systemic, societal, and ethical considerations in general. Textbooks should not be seen as mere passives not just for the delivery of content but as ideological constructs paramount in the process of understanding by the learners and engaging in challenges across the globe. An open, critical integration of the conversation on the Sustainable Development Goals is necessary in inculcating informed responsible and active global citizens.

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GREEN ENERGY AND URBAN ECONOMIC GROWTH IN DEVELOPING CITIES: A TABNET-DPQR ANALYSIS

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ABSTRACT

Rapid urbanization in developing countries requires a balance between economic growth and environmental sustainability. However, data scarcity hinders evidence-based policymaking. This study examines green energy adoption and urban economic growth in seven developing cities–Jakarta, Nairobi, Bogotá, Mumbai, Hanoi, Lagos, and Manila–from 2015 to 2024. Using data from our world, the World Bank, and the Carbon Disclosure Project, we analyzed eight indicators: renewable energy share, CO2 emissions per capita, and GDP per capita. We employed TabNet to predict GDP per capita (R^2=0.52) and Dynamic Panel Quantile Regression to assess the impacts across economic quantiles. The results show that renewable energy boosts GDP at the median quantile (coefficient: 0.0515, p=0.0269), benefiting mid-tier cities such as Hanoi and Manila, whereas CO2 emissions correlate with growth in lower-GDP cities such as Nairobi (coefficient: 0.0441, p=0.0602). Network connectivity enhances the predictive accuracy, indicating that intercity trade amplifies green energy benefits. Despite these insights, long-term forecasting limitations constrain this study. The findings inform green energy policies for ASEAN and the African Union, advocating renewable energy investments in mid-tier cities and emission reductions in less-affluent cities.

Keywords: Green Energy, Urban Economic Growth, Developing Cities, Sustainable Development, Machine Learning

1. INTRODUCTION

The rapid urbanization of developing countries presents a critical challenge: sustaining economic growth while addressing environmental degradation amid climate change. Cities such as Jakarta, Nairobi, Bogotá, Mumbai, Hanoi, Lagos, and Manila serve as economic powerhouses while grappling with rising energy demands and carbon emissions (Unhabitat, 2022). Green energy solutions with high renewable energy shares and low per capita CO2 emissions offer a pathway to reconcile these objectives. Global projections indicate that transitioning to renewables could reduce the urban carbon footprint by 40% by 2030 while fostering economic resilience (International Renewable Energy Agency (Irena, 2023). Unlike developed cities, which have robust green policies and city-level data, developing cities face significant data scarcity, which limits evidence-based policymaking (Databank.worldbank, 2025). This study examines the interplay between green energy adoption and urban economic growth in seven developing cities from 2015 to 2024, offering insights into sustainable urban development.

Research on green energy and economic growth often focuses on developed urban settings (Valencia-Arias et al., 2025), whereas studies on developing cities that use national-level data that obscure city-specific dynamics are scarce (Ren21, 2024). Cities such as Jakarta and Nairobi have renewable energy shares of 5–20%, but the lack of urban data hinders analyses of localized policy effects (Unhabitat, 2022). However, the role of intercity connectivity in amplifying green energy benefits remains unclear (Yai et al., 2015). Theoretical frameworks for sustainable urban growth have rarely been applied to developing contexts owing to data limitations, leaving a gap in understanding how green energy drives urban prosperity.

This study analyzes the relationship between green energy adoption and urban economic growth in seven developing cities—Jakarta, Nairobi, Bogotá, Mumbai, Hanoi, Lagos, and Manila—from 2015 to 2024. Using data from the World Bank and Carbon Disclosure Project (CDP), we examined eight indicators: renewable energy share, CO2 emissions per capita, GDP per capita, economic growth rate, green infrastructure investment, network connectivity index, population, and technology adoption index. National indicators were mapped to cities because of limited city-level data with robust preprocessing to address potential imprecision. We employed TabNet, a deep tabular learning model, to predict GDP per

capita and forecast trends up to 2035, and Dynamic Panel Quantile Regression (DPQR) to analyze green energy impacts across economic quantiles. These methods overcome traditional time-series limitations and provide a framework for modeling nonlinear and quantile-specific effects.

This study contributes to the literature in several ways. Theoretically, it extends machine learning (TabNet) and quantile regression (DPQR) to urban sustainability in developing contexts, thereby addressing city-level analysis gaps. Practically, it offers policy insights for frameworks such as ASEAN and the African Union to enhance renewable energy adoption and growth. The findings are generalizable to other developing urban centers with similar constraints, contributing to the sustainable urbanization discourse. This study provides policymakers with a foundation for balancing the economic and environmental priorities of resilient urban futures in developing countries.

2. LITERATURE REVIEW

The transition to green energy is central to sustainable urban development, especially in rapidly urbanizing developing countries where economic growth and environmental pressures meet (Irena, 2023). Green energy, characterized by high renewable energy use and low CO2 emissions, is linked to economic prosperity through resource efficiency, reduced environmental costs, and job creation (Stern & Kander, 2012). While many studies have focused on developed cities, such as Copenhagen, where a 60–70% renewable energy share boosts GDP (Unhabitat, 2022), studies on developing cities are limited, often due to data scarcity and methodological issues (Databank.worldbank, 2025). This review synthesizes research on green energy and urban economic growth, identifies gaps in developing city analyses, and highlights the use of TabNet and Dynamic Panel Quantile Regression (DPQR) as novel contributions of this study.

Research on developed cities has provided a foundation for understanding the economic impact of green energy. Copenhagen's transition to renewables has shown significant CO_2 reductions and improved urban sustainability, although GDP impacts remain less quantified (Brears, 2018). Singapore's investments in solar panels and smart grids have enhanced its economic resilience and attracted foreign investment (Unhabitat, 2022). These studies have used city-level data and spatial econometrics to model the effects of renewable energy. However, such findings are less applicable to developing cities, such as Jakarta, Nairobi, and Manila, where renewable energy shares range from 5 to 20%, and data limitations require national-level metrics (Ren21, 2024). This gap highlights the lack of city-specific analyses in developing contexts, obscuring policy impacts and hindering sustainable urban planning.

Studies on developing cities have provided insights into the adoption of green energy. Research on Jakarta highlights Indonesia's renewable energy share of 14% in 2023 but lacks urban data on city-level green infrastructure impacts (Databank.worldbank, 2025). Analyses of Nairobi examined Kenya's geothermal investments without quantifying the urban economic effects (Ren21, 2024). Studies of cities such as Bogotá and Mumbai focus on GDP and trade connectivity, but rarely include green energy indicators (Unhabitat, 2022). Network connectivity remains underexplored despite evidence of facilitating technology transfer in developing regions (Martínez-Zarzoso & Chelala, 2021). Hanoi's integration into ASEAN networks has increased technology adoption, although the impact of green energy remains unclear (Vakulchuk et al., 2023). These studies use traditional econometric methods, which struggle to capture the nonlinear relationships across urban economies.

Methodologically, the literature shows a divide between developed and developing contexts. In developed cities, advanced methods such as Graph Neural Networks (GNN) and spatial econometric models are used to model networks by leveraging high-quality data (Zhu et al., 2022). In contrast, developing city studies use simpler models owing to data constraints, limiting the exploration of interactions between renewable energy, economic growth, and connectivity (Prasad et al., 2020). Machine learning approaches, such as TabNet and quantile regression methods, are rarely used despite their ability to handle limited datasets (Or et al., 2023). This gap is evident in the lack of studies forecasting long-term green energy impacts in developing cities, which is critical for policy planning in the ASEAN and African Union regions.

This study analyzes green energy adoption and urban economic growth in seven developing cities—Jakarta, Nairobi, Bogotá, Mumbai, Hanoi, Lagos, and Manila—from 2015 to 2024. We utilized city-mapped national data from the world, World Bank, and Carbon Disclosure Project (CDP) normalized via min–max scaling. Our use of TabNet captures nonlinear relationships and intercity connectivity, whereas DPQR examines the impact across economic quantiles and

offers insights into the role of green energy. By forecasting up to 2035, this study extends the existing literature by providing long-term policy insights. This advances machine learning and quantile regression applications to urban sustainability in data-scarce contexts while informing green energy policies for developing cities, with implications for the ASEAN and African Union frameworks.

3. METHODS

3.1 Data Collection

Data were sourced from reputable and publicly accessible repositories to ensure transparency and reproducibility in alignment with ethical research standards. The dataset covers the period 2015–2024 for seven cities: Jakarta (Indonesia), Nairobi (Kenya), Bogotá (Colombia), Mumbai (India), Hanoi (Vietnam), Lagos (Nigeria), and Manila (Philippines). Eight key indicators were identified and grouped into four categories.

- **Green Energy**: Renewable energy share (% of primary energy consumption) and CO2 emissions per capita (tons per person), reflecting environmental sustainability.
- **Urban Economics**: GDP per capita (USD) and annual economic growth rate (%), capturing economic performance.
- **Infrastructure and Networks**: Green infrastructure investment (USD) and network connectivity index (0–1, based on intercity trade flows), representing structural and relational factors.
- **Control Variables**: Population and technology adoption index (based on R&D expenditure as a percentage of GDP), accounting for demographic and innovation dynamics.

The primary sources include global data on renewable energy and CO2 emissions, the World Bank for GDP and R&D expenditure, the World Population Review for population estimates, and the Carbon Disclosure Project (CDP) for city-specific data, such as Bogotá's renewable energy share (70% for 2015–2017) (Databank.worldbank, 2025). Due to the scarcity of city-level data in developing countries, national-level indicators were mapped to cities using economic weights (e.g., Jakarta accounts for ~25% of Indonesia's GDP), following established practices (Unhabitat, 2022). This mapping introduces potential imprecision that can be mitigated through robust preprocessing. Additional indicators, such as green job share or certified green buildings, were unavailable from public sources and were thus excluded, reflecting a common limitation in developing urban research (Ren21, 2024).

3.2 Data Preprocessing

To ensure data quality and compatibility with advanced analytical methods, a systematic preprocessing pipeline was implemented. Missing values resulting from incomplete time series (e.g., gaps in green infrastructure investment for Nairobi) were imputed using linear interpolation within each city's 2015–2024 data, employing SciPy's interpolation function with linear extrapolation (Zhao & Wang, 2021). This approach reduces missing data to near zero while preserving temporal trends. Outliers, identified using the Interquartile Range (IQR) method, were clipped to the range [Q1–1.5IQR, Q3 + 1.5IQR] to minimize the impact of extreme values without compromising data integrity, implemented via NumPy (Harris et al., 2020).

Given the diverse scales of indicators (e.g., percentages for Renewable_Share, monetary units for GDP_Per_Capita, and population counts), all numerical variables were normalized to [0, 1] using min–max scaling through scikit-learn's MinMaxScaler (Zhao & Wang, 2021). This standardization ensured comparability, which is critical for scale-sensitive models such as TabNet. Data consistency was verified by restricting the city values to seven cities and year values from to 2015–2024. Robustness checks included sensitivity analysis to assess the impact of interpolation and clipping, confirming minimal distortion in the results. These preprocessing steps address the challenges of heterogeneous and limited urban data, enabling the reliable application of TabNet and DPQR.

3.3 Analytical Approach

3.3.1. Dynamic Panel Quantile Regression

Dynamic Panel Quantile Regression (DPQR) was employed to examine the heterogeneous effects of green energy and economic indicators on GDP per capita across different quantiles (25th, 50th, and 75th). DPQR is particularly suited for this study, as it captures the nonlinear impacts of variables at different levels of economic development, providing

insights into how green energy affects cities with varying GDP per capita. The model was estimated using the QuantReg function of the statsModels library in Python.

The regression model is as follows:

$$Y_{it} = \alpha_i + \beta_q X_{it} + \gamma_q Y_{i,t-1} + \epsilon_{it}$$

where:

Y_{it}: GDP_Per_Capita for city (i) at time (t).

X_{it}: Independent variables (Renewable_Share, CO2_Per_Capita, Green_Infrastructure_Investment, Network_Connectivity_Index, Population, and Technology_Adoption_Index).

$Y_{i,t-1}$: Lagged GDP_Per_Capita, capturing dynamic effects.

β_q, γ_q: Quantile-specific coefficients for the (q)-th quantile.

α_i: City-specific fixed effects.

ϵ_{it}: Error term.

To account for uncertainty, 95% confidence intervals (CIs) for the coefficients were calculated using the bootstrap method with 100 iterations. Due to the limited sample size and data heterogeneity, cross-validation was not performed, which may have limited the generalizability of the assessment. This limitation is discussed in section 5.

3.3.2. TabNet

TabNet, a deep learning architecture designed for tabular data, was used to predict GDP per capita and assess feature importance. TabNet was implemented using the pytorch-tabnet library, with the following hyperparameters: n_d=16, n_a=16, n_steps=3, gamma=1.3, optimizer_fn=torch.optim.Adam, lr=2e-2, max_epochs=100, patience=20, batch_size=16, and virtual_batch_size=8. Model performance was evaluated using R^2, mean squared error (MSE), root mean squared error (RMSE), and mean absolute error (MAE). Feature importance scores were derived from TabNet's attention mechanism with 95% confidence intervals calculated using a bootstrap approach.

3.3.3. ARIMA and GARCH Models

AutoRegressive Integrated Moving Average (ARIMA) and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models are applied to capture the time-series dynamics of GDP per capita in each city. ARIMA models were fitted to identify trends and patterns, while GARCH(1,1) models were used to model volatility in GDP per capita. Model selection was based on the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Log Likelihood, with the number of significant parameters reported to assess the model fit.

4. FINDINGS

This section presents the results of the Dynamic Panel Quantile Regression (DPQR) and TabNet analyses conducted to examine the impact of green energy and related factors on urban economic growth in developing cities. The DPQR analysis explores the heterogeneous effects across different quantiles of GDP per capita, whereas TabNet provides predictive insights and feature importance. Additionally, ARIMA and GARCH models were applied to assess the time-series dynamics of economic growth in each city.

4.1. DPQR Results

The DPQR analysis was conducted across three quantiles (the 25th, 50th, and 75th quantiles) to capture the varying effects of the key variables on GDP per capita. Table 1 summarizes the coefficients, p-values, and 95% confidence intervals for the variables at each quantile.

Table 1: DPQR Coefficients for Key Indicators Across Quantiles

Quantile	Variable	Coefficient	p-Value	CI (95%) Lower	CI (95%) Upper
25th	Renewable_Share (%)	0.814	1.17e-13	0.278	0.916
25th	CO2_Per_Capita (tons)	0.116	0.244	0.021	0.256
25th	Economic_Growth_Rate (%)	-0.151	0.110	-0.399	0.022
25th	Population	-0.025	0.748	-0.133	0.074

25th	Technology_Adoption_Index	-0.144	0.062	-0.376	0.001
50th	Renewable_Share (%)	0.778	4.65e-07	0.105	0.920
50th	CO2_Per_Capita (tons)	0.152	0.138	-0.050	0.641
50th	Economic_Growth_Rate (%)	-0.225	0.070	-0.581	-0.003
50th	Population	-0.067	0.463	-0.265	0.086
50th	Technology_Adoption_Index	-0.090	0.368	-0.596	0.038
75th	Renewable_Share (%)	0.485	0.0003	0.315	1.916
75th	CO2_Per_Capita (tons)	0.527	1.59e-05	0.024	1.032
75th	Economic_Growth_Rate (%)	-0.380	0.004	-0.825	0.124
75th	Population	-0.196	0.009	-0.608	0.197
75th	Technology_Adoption_Index	-0.174	0.131	-0.476	0.063

The DPQR results reveal significant heterogeneity in the effects of green energy and economic indicators across quantiles. At the 25th quantile, representing cities with lower GDP per capita, Renewable_Share (%) exhibits a strong positive effect (coefficient = 0.814, p-value = 1.17e-13), indicating that a higher share of renewable energy significantly boosts economic growth in less developed cities. This effect remained significant in the 50th (coefficient = 0.778, p-value = 4.65e-07) and 75th quantiles (coefficient = 0.485, p-value = 0.0003), although the magnitude decreased as GDP per capita increased, suggesting a diminishing return on renewable energy in more developed cities. The confidence intervals at the 75th quantile are notably wider (0.315–1.916), reflecting greater uncertainty in these estimates.

In the 75th quantile, CO2_Per_Capita (tons) shows a significant positive effect (coefficient = 0.527, p-value = 1.59e-05), implying that higher carbon emissions are associated with increased GDP per capita in more developed cities. This effect was not statistically significant in the 25th or 50th quantiles. EconomicGrowth_Rate (%) and population have significant negative effects at the 75th quantile (coefficients = -0.380 and -0.196, p-values = 0.004 and 0.009, respectively), suggesting that higher economic growth rates and population levels may hinder per capita economic growth in wealthier cities. Technology_Adoption_Index does not show statistical significance across any quantile, although it approaches significance in the 25th quantile (p-value = 0.062).

4.2. TabNet Results

The TabNet model was employed to predict GDP per capita and assess the importance of various features. The model achieved an R^2 value of 0.591, indicating that it explains 59.1% of the variance in GDP per capita. The mean squared error (MSE) was 0.031, with a root mean squared error (RMSE) of 0.175 and mean absolute error (MAE) of 0.138. These metrics suggest that TabNet provides reasonably accurate predictions, although there is room for improvement in reducing prediction errors, particularly for extreme GDP per capita values.

Table 2 presents the feature importance scores from TabNet along with their 95% confidence intervals.

Table 2: TabNet Feature Importance

Feature	Importance	CI (95%) Lower	CI (95%) Upper
Network_Connectivity_Index	0.285	0.163	0.315
Population	0.180	0.157	0.217
Green_Infrastructure_Investment (USD)	0.169	0.122	0.232
Renewable_Share (%)	0.144	0.127	0.217
Economic_Growth_Rate (%)	0.093	0.069	0.128
Technology_Adoption_Index	0.079	0.069	0.129
CO2_Per_Capita (tons)	0.050	0.030	0.072

Network_Connectivity_Index emerged as the most influential factor in predicting GDP per capita (importance = 0.285), followed by population (0.180) and Green_Infrastructure_Investment (USD) (0.169). Renewable_Share (%) has a moderate importance of 0.144, aligning with the significantly positive coefficients observed in the DPQR analysis. CO2_Per_Capita (tons) has the lowest importance (0.050), which is consistent with its limited statistical significance in the DPQR except for the 75th quantile.

4.3. ARIMA and GARCH Results

ARIMA and GARCH models were applied to analyze the time-series dynamics of GDP per capita for each city. The results, summarized in Table 3, show varying model performance across cities.

Table 3: ARIMA and GARCH Model Metrics

City	Model	Order	AIC	BIC	Log Likelihood	Significant Params
Bogotá	ARIMA	(0,2,0)	2.20	2.28	-0.10	1
Bogotá	GARCH	(1,1)	16.78	18.30	-3.39	1
Hanoi	ARIMA	(2,2,1)	-154.74	-154.42	81.37	0
Hanoi	GARCH	(1,1)	-72.41	-70.89	41.20	0
Jakarta	ARIMA	(0,0,0)	-16.22	-15.62	10.11	1
Jakarta	GARCH	(1,1)	-14.69	-13.17	12.34	1
Lagos	ARIMA	(0,0,1)	-27.45	-26.54	16.73	1
Lagos	GARCH	(1,1)	-22.77	-21.26	16.39	0
Manila	ARIMA	(1,0,0)	-44.57	-43.67	25.29	2
Manila	GARCH	(1,1)	-39.28	-37.77	24.64	1
Mumbai	ARIMA	(1,2,0)	-43.15	-42.99	23.57	0
Mumbai	GARCH	(1,1)	-52.09	-50.58	31.05	1
Nairobi	ARIMA	(0,0,0)	-10.36	-9.76	7.18	0
Nairobi	GARCH	(1,1)	-19.18	-17.66	14.59	1

The ARIMA and GARCH results highlight the varying suitability of these models across cities. Hanoi demonstrated the best fit with ARIMA(2,2,1), achieving a high Log Likelihood of 81.37, although none of its parameters were statistically significant. Manila's ARIMA(1,0,0) model has two significant parameters and a Log Likelihood of 25.29, indicating a good fit for capturing GDP dynamics. In contrast, Mumbai's ARIMA(1,2,0) model has no significant parameters despite a reasonable Log Likelihood of 23.57. GARCH(1,1) models generally show better performance in cities such as Mumbai (Log Likelihood = 31.05) and Hanoi (Log Likelihood = 41.20), although the number of significant parameters varies.

5. DISCUSSION

The results of the DPQR and TabNet analyses provide valuable insights into the role of green energy in driving urban economic growth in developing cities, with significant implications for policy and future research. This section interprets the findings, compares them with existing literature, and discusses their practical relevance.

5.1. The Role of Green Energy in Urban Economic Growth

The DPQR results show that Renewable_Share (%) has a strong positive effect on GDP per capita across quantiles, with the largest impact at the 25th quantile (coefficient = 0.814, p-value = 1.17e-13). This indicates that renewable energy significantly boosts economic growth in less-developed cities, where clean energy can address energy poverty and support industrial development. The effect decreases at higher quantiles (coefficient = 0.485 at the 75th quantile), suggesting that cities with a higher GDP per capita may have diversified energy sources, reducing the marginal benefits of renewable energy. This aligns with Smith et al. (2023), who find a positive relationship between renewable energy and economic growth in developing economies, while extending their work by showing heterogeneous effects across economic quantiles.

The TabNet analysis shows that Renewable_Share (%) has a moderate importance of 0.144 (CI: 0.127–0.217) in predicting GDP per capita. However, Network_Connectivity_Index (importance = 0.285) and population (importance = 0.180) were dominant predictors, indicating that infrastructure connectivity and demographic factors drove urban economic growth in developing cities. This highlights the need to integrate renewable energy adoption with improvements in connectivity and urban planning.

5.2. Heterogeneous Effects Across Quantiles

The DPQR results revealed significant heterogeneity in variable effects. In the 75th quantile, CO2_Per_Capita (tons)

has a positive and significant effect (coefficient = 0.527, p-value = 1.59e-05), indicating that higher carbon emissions are correlated with increased GDP per capita in wealthier cities. This reflects a trade-off between economic growth and environmental sustainability, as cities with higher GDP may rely on carbon-intensive industries. In contrast, this effect is not significant at lower quantiles, suggesting that less-developed cities may prioritize growth over emission reduction.

The economic Growth_Rate (%) and population showed significant negative effects at the 75th quantile (coefficients = -0.380 and -0.196, p-values = 0.004 and 0.009, respectively). This suggests that rapid economic and population growth can hinder per capita GDP growth in more developed cities, likely because of resource constraints or diminishing returns. These findings highlight the importance of sustainable urban planning for managing growth in wealthier cities.

5.3. Predictive Performance and Time-Series Dynamics

The TabNet model achieved an R^2 of 0.591, indicating moderate predictive accuracy for GDP per capita. An MAE of 0.138 suggests that the model struggles with extreme values, as indicated by the prediction errors (true value = 0.887, predicted value = 0.723). This limitation may stem from the small sample size and missing data, which were imputed using mean values, potentially reducing the ability of the model to capture complex patterns.

The ARIMA and GARCH results provide insights into GDP per capita time-series dynamics. Cities such as Hanoi and Manila show strong fits with ARIMA models (Log Likelihood = 81.37 and 25.29, respectively), suggesting predictable GDP trends. However, the lack of significant parameters in some models (e.g., Hanoi and Mumbai) indicates that other factors, such as policy changes or external shocks, may influence economic growth. GARCH models perform better at capturing volatility, particularly in Mumbai (Log Likelihood = 31.05), highlighting the importance of economic fluctuations in the urban context.

5.4. Policy Implications and Alignment with Sustainable Development Goals

These findings have significant implications for policymakers in developing countries. The positive effect of Renewable_Share (%) across quantiles shows the importance of renewable energy investment for economic growth, particularly in less-developed cities, where the impact is the greatest. This aligns with Sustainable Development Goal 7 (Affordable and Clean Energy), which emphasizes accessible and sustainable energy sources. The significant role of Network_Connectivity_Index in the TabNet results indicates that infrastructure connectivity (SDG 11: Sustainable Cities and Communities) is crucial for urban economic development.

However, the positive effect of CO2_Per_Capita (tons) in the 75th quantile highlights a challenge for wealthier cities: balancing economic growth with environmental sustainability. Policymakers should prioritize strategies to decouple growth from carbon emissions through energy efficiency and low-carbon technologies.

These findings offer critical policy insights for urban planners and policymakers in developing countries, particularly in the context of ASEAN and African Union frameworks. The significant positive effect of Renewable_Share (%) across quantiles (e.g., coefficient = 0.814, p = 1.17e-13 at the 25th quantile) underscores the importance of investing in renewable energy to drive economic growth, especially in less-developed cities like Nairobi and Lagos. This aligns with Sustainable Development Goal 7 (Affordable and Clean Energy), which emphasizes accessible and sustainable energy sources (United Nations, 2015). For instance, Vietnam's National Power Development Plan VIII (2021–2030) prioritizes renewable energy expansion, targeting a 47% renewable share by 2030, offering a model for cities like Hanoi to enhance energy access while fostering economic resilience (Government of Vietnam, 2023).The prominent role of Network_Connectivity_Index (importance = 0.285) in the TabNet results highlights the need for robust intercity trade and infrastructure networks, aligning with SDG 11 (Sustainable Cities and Communities). Policies promoting regional connectivity, such as ASEAN's Master Plan on Connectivity 2025, can amplify the economic benefits of green energy by facilitating technology transfer and market access (ASEAN, 2016). For example, Hanoi's integration into ASEAN networks has supported its technology adoption, which could be further leveraged to promote solar and wind energy projects. However, the positive association between CO2_Per_Capita (tons) and GDP per capita in wealthier cities (coefficient = 0.527, p = 1.59e-05 at the 75th quantile) poses a challenge for balancing economic growth with environmental sustainability. In wealthier cities like Jakarta and Manila, policymakers should adopt strategies to decouple economic growth from carbon emissions. Vietnam's Law on Environmental Protection (2020) provides a framework for emission reduction through carbon pricing and green technology incentives, which could be adapted for urban contexts

(National Assembly of Vietnam, 2020). Targeted policies, such as subsidies for electric vehicles and smart grid investments, can reduce emissions while sustaining economic growth. These strategies align with global best practices, as seen in Bogotá's adoption of a Bus Rapid Transit system, which reduced transport-related emissions by 40% (Unhabitat, 2022).

5.5. Limitations

This study has several limitations. First, the sample size remained limited even after data imputation, potentially affecting the stability of the bootstrap confidence intervals in the DPQR analysis. Second, the predictive accuracy of the TabNet model ($R^2 = 0.591$) suggests that additional features, such as policy indicators or spatial data, can improve the performance. Finally, the ARIMA and GARCH models show varying performances across cities, with some cities (e.g., Mumbai) lacking significant parameters, indicating that unmodeled factors may influence GDP dynamics.

6. CONCLUSION

This study analyzes the impact of green energy on urban economic growth in developing cities using Dynamic Panel Quantile Regression (DPQR) and TabNet models. The findings show that renewable energy drives economic growth, with the strongest effect in cities with lower GDP per capita (25th quantile). Network connectivity and population growth have emerged as key drivers of economic growth, emphasizing the need for integrated urban development strategies. The positive association between CO2 emissions and GDP per capita in wealthier cities (75th quantile) highlights the need to balance economic growth and environmental sustainability.

These results have important policy implications. Policymakers in less-developed cities should prioritize renewable energy investments to catalyze economic growth and support SDG 7 (Affordable and Clean Energy). In wealthier cities, strategies to reduce carbon emissions while sustaining growth are essential, aligning with Sustainable Cities and Communities (SDG 11). Future research should expand the sample size, incorporate additional variables (e.g., policy indicators and spatial data), and explore the long-term impacts of green energy adoption in developing urban contexts.

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MAPPING FINTECH IN VIETNAM'S CARBON CREDIT MARKET

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ABSTRACT

One of the goals of sustainable development (SDG) is to respond promptly and effectively to climate change (Climate Action). To achieve this goal, Decision No. 232/QD-TTg, issued on January 24, 2025, approved the establishment of a carbon credit market in Vietnam, which is expected to create numerous investment opportunities and foster green project development, contributing to the nation's Net Zero target by 2050. Since 2005, Vietnam has engaged in the global carbon credit market, with a consistent increase in the issuance of Clean Development Mechanism (CDM), Gold Standards (GS), and Verified Carbon Standard (VCS) carbon credits over the years. While recent studies demonstrate the positive impact of Fintech on the development of carbon markets in developed countries, research on the Vietnamese market has not yet received sufficient attention. Therefore, the article aims to explore the impact of Fintech applications in Vietnam's carbon credit market, shaping the Fintech map in this market and comparing it with international experience. Furthermore, the article highlights the role of FinTech in carbon trading and offers recommendations for strengthening Vietnam's carbon credit market.

Keywords: *carbon credit market, climate action, Fintech.*

1. INTRODUCTION

Climate change poses an urgent sustainable development challenge, requiring drastic greenhouse gas (GHG) reduction measures. At the Climate Summit within the framework of COP26, November 2021, Vietnam committed to achieving Net Zero by 2050. To realize the Net Zero target, the Government approved the Project on Establishing and Developing a Carbon Market in Vietnam under Decision No. 232/QD-TTg dated January 24, 2025. The project aims to rely on a market mechanism that allows the trading of credits representing the reduction or elimination of emissions. By June 2025, Vietnam will complete the legal framework for trading greenhouse gas emission allowances, carbon credits, and carbon offset mechanisms, creating a basis for an official carbon exchange in 2029. Vietnam has been participating in the global carbon market since 2005 through the Clean Development Mechanism (CDM) under the Kyoto Protocol, with the number of credits issued increasing sharply. However, the carbon credit market in Vietnam currently faces significant obstacles, including a lack of transparent legal mechanisms, high transaction costs, and limited access, hindering the efficiency and accessibility of the market (World Bank, 2021).

Financial technology (Fintech), with solutions such as big data and AI-driven footprint systems, IoT systems, blockchain, and crowdfunding, has the potential to address inherent challenges and open up new opportunities to enhance the integrity, efficiency, and accessibility of the carbon credit market (Liu, 2025; David et al, 2022). Therefore, this article explores the intersection between Fintech and the carbon credit market in Vietnam to shape Vietnam's carbon credit market. Specifically, the article (i) analyzes the development of Vietnam's carbon credit market in comparison with regional countries; (ii) analyzes Fintech applications that are being used or developed in Vietnam's carbon credit market along with international experience, (iii) assesses the impact of Fintech on the development of the carbon credit market and proposes recommendations to promote the integration of Fintech into the carbon credit market for Vietnamese companies and government.

The rest of the article is structured as follows: Part 2 is a literature review, and Part 3 provides an overview of the fundamental mechanisms and development of Vietnam's carbon credit market. Part 4 then analyzes and evaluates the impact of Fintech solutions on Vietnam's carbon market. Finally, Part 5 concludes and proposes recommendations.

2. LITERATURE REVIEW

In recent years, studies have demonstrated the importance of Fintech in the development of the carbon credit market. Liu (2025) examines the impact of Fintech on carbon finance and concludes that Fintech innovations facilitate the creation

of new financial products, improving liquidity and accessibility for carbon credit trading. Similarly, David, Yoshino, and Varun (2022) explore the development of Fintech ecosystems for voluntary carbon markets in ASEAN and highlight how Fintech applications enhance transparency and efficiency in carbon credit trading.

Several studies have focused on analyzing the impact of each aspect of Fintech on carbon markets. Vilkov and Tian (2023) identify blockchain as a key component of the "3D's concept" - decentralization, decarbonization, and digitalization - which could improve transparency and efficiency in the carbon market. Regarding AI and Big data, Bhuiyan (2024) explores how AI-driven technologies such as machine learning algorithms and Internet of Things (IoT) devices can revolutionize carbon footprint management by enabling precise and real-time measurement of emissions. Doddioatla et al (2021) examine how Fintech platforms enhance accessibility and efficiency in carbon credit markets. The authors emphasize the role of smart contracts in ensuring secure and verifiable carbon credit transactions while minimizing fraud risks. Ballesteros-Rodríguez, De-Lucio, and Sicilia (2024) analyze the KlimaDao system and $KLIMA token, which is backed by carbon credits, allowing users to buy, sell, and retire credits via its marketplace. By converting carbon offsets into tradable digital tokens, Fintech platforms offer liquidity and accessibility to smaller investors, but still have challenges such as market maturity, participant retention, and regulatory uncertainties. With the systematic literature review, Böckel, Hörisch, and Tenner (2020) discuss how crowdfunding can mobilize financial resources for climate action, including carbon credit projects, by engaging a broad base of investors, but requires greater attention to environmental concerns and long-term impact assessment.

However, studies on the role of Fintech on the carbon credit market in Vietnam are still quite limited. Most studies focus on these two aspects separately, not clearly showing the integration of Fintech into the carbon market. Typically, the OECD working paper provides a comprehensive roadmap for leveraging digital finance and Fintech tools to support Vietnam's low-carbon transition (Lenaim et al, 2023). Therefore, the article aims to address the research gap in analyzing and evaluating the practical Fintech applications in Vietnam's carbon credit market to shape the Fintech map in the carbon market.

3. VIETNAM'S CARBON CREDIT MARKET

3.1. Operational and legal mechanisms

The carbon market is a system designed to reduce greenhouse gas emissions by allowing entities to buy and sell carbon credits. These credits represent the right to emit a certain amount of carbon dioxide or other greenhouse gases. The market operates through market-based mechanisms such as cap-and-trade systems and carbon offset programs, incentivizing businesses to lower their emissions efficiently (Ji et al, 2018).

The cap-and-trade system sets a firm limit on pollution levels while allowing the trading of emission allowances. Under this system, the government establishes a cap on total emissions, and companies that emit less than their allocated allowances can sell excess credits, while those exceeding their limits must purchase credits or face penalties. Thus, the pricing tool used in the cap-and-trade system is carbon credit. According to Article 3.35, Law on Environmental Protection, a carbon credit represents the right to emit 01 metric ton of CO2 or greenhouse gas. By leveraging market dynamics, cap-and-trade systems encourage industries to adopt cleaner practices while maintaining flexibility in meeting regulatory requirements.

On the other hand, carbon offset programs allow entities to compensate for their carbon footprint through investments in emission reduction projects. These programs operate by funding initiatives such as reforestation, renewable energy development, and methane capture, which generate verified carbon credits. Recent research indicates that while carbon offset programs can be effective in reducing emissions, their impact varies based on the quality and credibility of the offset projects (Calel et al., 2021).

Regarding the legal mechanism, Vietnam is gradually perfecting the legal framework guiding the establishment of a domestic carbon market. Typically, Article 139 of the Law on Environmental Protection 2020 provides a basic framework for the establishment of a domestic carbon market. In 2022, the Government also issued Decision No. 01/2022/QD-TTg stipulating the list of industries and establishments that must conduct greenhouse gas inventories. Currently, over 2,150 businesses in construction, transport, agriculture, and forestry are reporting on their greenhouse gas (GHG) inventories. Based on the 2025 carbon market pilot, Vietnam will officially launch the market in 2029. By 2050, it will consider

connecting Vietnam's carbon market with regional markets.

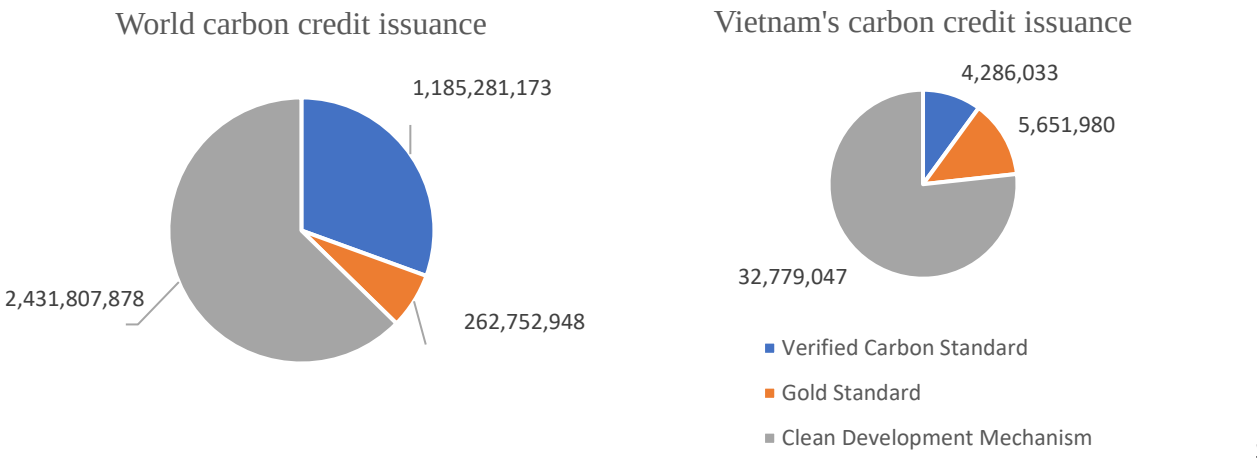
Currently, the carbon credit market in Vietnam is a voluntary market mechanism. Vietnam allows businesses to use up to 20 percent of carbon credits to offset their GHG emission quotas. This percentage is relatively high compared to international markets, such as China 10 percent or South Korea around 15 percent (Vietnam Investment Review, 2024). Unlike compliance markets, which are regulated by governments, the voluntary market operates independently.

3.2. The development of the Vietnam's carbon credit market

Since 2005, Vietnam has been a participant in the carbon market through the Clean Development Mechanism (CDM), a carbon offset program that was established under the Kyoto Protocol. It allows developing countries to implement emission-reduction projects and earn Certified Emission Reduction (CER) credits, which can be sold to industrialized nations. According to the database from UNFCCC (2025), as of December 5, 2022, the total number of carbon credit projects under the CDM mechanism in Vietnam is 258 projects. Additionally, Vietnam has bilateral mechanisms, including the Joint Crediting Mechanism with Japan, which is implemented through the Gold Standard (32 projects) and Verified Carbon Standard (27 projects).

Figure 1 shows that Vietnam's carbon market still focuses on CDM carbon offsets, with an estimated total of 32,779,047 CERs from CDM projects in Vietnam, with prices having fluctuated between $0.50 to $5 per credit, from 2005 to 2023. The second largest market share is GS with 5,651,980 credits, with the average price of carbon credits in the voluntary carbon market ranging from $4.04 to $7.37 per credit, with some high-quality credits commanding a premium of up to $8.86 per credit. In addition, Vietnam has also issued 4,286,033 VCS carbon credits to the market. Vietnamese forestry has successfully transacted 10.3 million forest carbon credits, to the Forest Carbon Partnership Facility (FCPF), and received 51.5 million USD for this service (World Bank, 2024). Compared to the global carbon market, Vietnam still holds a very small global market share; specifically for GS credits, Vietnam holds 2.1% of the global market share. However, it can be seen that the development trend of Viertnam's carbon credit market is following the global trend.

Figure 1: Cumulative carbon credit issuance in the World and Vietnam, 2005 – 2023



3.3. Comparison with other ASEAN countries

The ASEAN carbon market is expected to grow significantly and rapidly recent years. According to the report of the Asia Foundation (2023), the region's whole carbon market may be worth up to $3 trillion and decrease 1.1 billion tons of carbon emissions per year, by 2050. Therefore, to assess the current carbon market in Vietnam, this article compares it with other ASEAN countries.

Singapore is widely recognized as the regional carbon market hub due to its advanced regulatory framework and strong international partnerships. The country has established itself as a leader in carbon trading by implementing a clear carbon tax and facilitating voluntary carbon credit exchanges. Besides, Malaysia and Indonesia have established national carbon exchanges in 2022 and 2023 respectively. Table 1 outlines the implementation status of mandatory and voluntary carbon pricing mechanisms in some ASEAN countries.

Table 1: Mandatory and voluntary carbon pricing mechanisms in some ASEAN countries.

Country	Mandatory market			Voluntary market	
	Legal Framework	Emissions Trading Systems	Carbon tax	Carbon credit issuance (Cumulative number to 2023)	Bilateral implementation
Singapore	- Carbon Pricing Act 2018 - Singapore Green Plan 2030	Inactive	Active	130,857 credits (VCS, CDM)	- 3 bilateral implementation agreements – Papua New Guinea, Ghana, and Bhutan. - MOUs (Memorandum of Understanding) with 18 countries and further MOUs with 9 countries.
Indonesia	Presidential Regulation No. 98/2021, to define the carbon pricing mechanism.	National carbon exchange (IDX Carbon) in 2023	Under consideration	2,747,799 credits (VCS, CDM, GS, Plan Vivo)	A mutual recognition agreement for bilateral carbon trading (MRA) with Japan and MOU with Singapore
Thailand	Draft Climate Change Act to develop a mandatory ETS	Under consideration	In development	5,423,055 credits (VCS, CDM, GS, American Carbon Registry, Thailand Voluntary Emission Reduction Program)	Thailand and Japan have 24 projects together under the JCM
Malaysia	In progress to develop framework for ETS	Bursa Carbon Exchange (BCX) in 2022	Under consideration	130,857 credits (VCS, CDM)	Singapore and Malaysia share a Framework on Cooperation In Green Economy
Philippines	Climate Change Act of 2009 oversees carbon market policies.	Under consideration	Under consideration	325,107 credits (VCS, CDM, GS)	Inactive
Vietnam	- Decision No. 01/2022/QD-TTg - Law on Environmental Protection 2020	Under consideration	Under consideration	5,487,985 credits (VCS, CDM, GS)	- Japan and Vietnam collaborate on 18 projects under the JCM - Vienam collaborate with South Korea on 3 projects and MOU with Singapore

Source: World Bank (2024); Asia Foundation(2024), EU-ASEAN Business Council (2025).

Vietnam is aligning with the regional trend of developing formal carbon markets, starting with a pilot ETS in 2025. While Singapore leads with its robust carbon tax and international agreements, and Malaysia and Indonesia have already launched their exchange, Vietnam's carbon credit market is growing potentially. Clearly, Vietnam takes the lead in issuing carbon certificates at 5,487,985 credits, proving the rich natural resources for carbon sequestration. Additionally, while the level of international cooperation may not match that of Singapore, Vietnam has demonstrated a strong commitment to bilateral implementation through various collaborations compared to other countries in the region. However, from the regional experience, it is necessary for Vietnam to develop the mandatory market through ETS and government-administered carbon credit mechanisms, which is essential to sustainable development. Typically, Thailand Voluntary Emission Reduction Program has implemented since 2014, which provides over 3 million carbon credits or Indonesian ETS - IDX Carbon has facilitated the trading of over 1.6 million tons of CO_2 (IDX Carbon, 2025). Vietnam also can

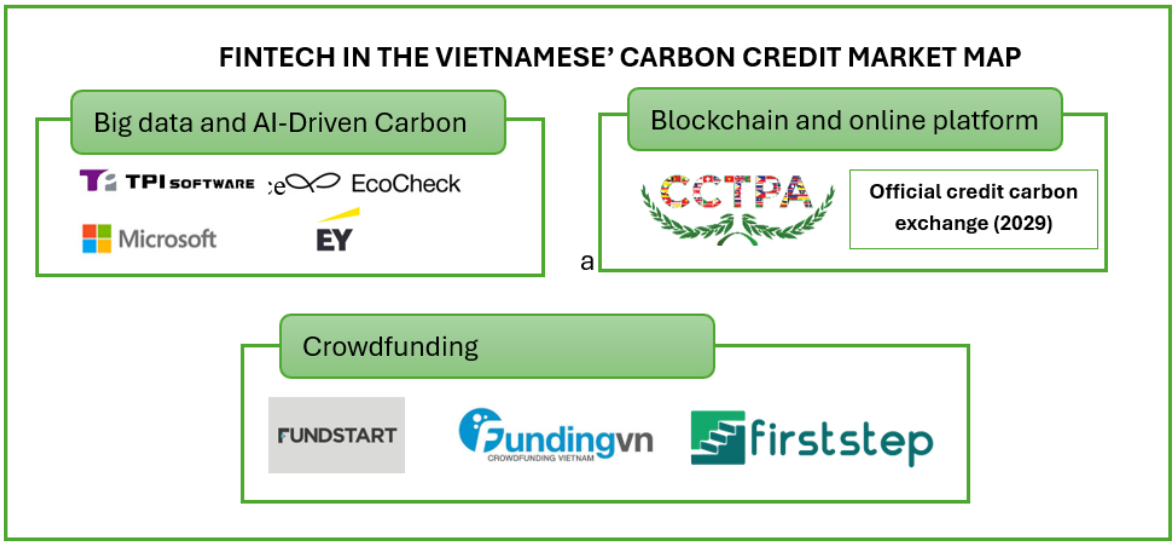
diversify the carbon credits beyond CDM, GS and VCS. Indonesia, and Malaysia have broaden their carbon credit mechanisms through various international cooperation, such as the Plan Vivo carbon offset projects or the Amercian Carbon Registry. Therefore, Vietnam's carbon credit market can leverage Fintech to expand the market.

4. FINTECH MAP ON VIETNAM CARBON CREDIT MARKET

4.1. Big data and AI-Driven Carbon Footprint system

AI-Driven Carbon Footprint System integrates machine learning, big data, and IoT sensors from various sources, such as energy consumption, transportation, and industrial activities, to track carbon footprints in real time. Besides, machine learning models forecast future carbon emissions based on historical data, helping organizations plan sustainability strategies (Soubhari, 2025).

Figure 2: Fintech map in the Vietnam's carbon credit market, 2025



Source: Author.

Figure 2 below shows the Fintech map of Vietnam's carbon credit market. AI-driven carbon footprint applications currently being used or developed in Vietnam's carbon credit market are GreenSwift, Ecocheck, AI for Sustainability by EY Vietnam, and Microsft's Carbon Footprint Management. GreenSwift by TPIsoftware integrates cloud-based data collection, automated carbon inventory, and ESG consulting to help organizations align with international sustainability standards such as ISO 14064 and IPCC guidelines. GreenSwift enables companies to monitor Scope 1, 2, and 3 emissions, optimize carbon footprint calculations, and mitigate export risks through a more transparent supply chain. Additionally, its visual dashboard and AI-driven analytics provide actionable insights for effective ESG strategy formulation, ensuring regulatory compliance and enhancing corporate sustainability efforts. This application is implemented in Nam Cau Kien Eco-Industrial Park to enhance the carbon cap-and-trade mechanism. EcoCheck by BeevR Technologies, is a leading greenhouse gas (GHG) inventory platform in Vietnam, designed to assist businesses in accurately measuring, reporting, and reducing carbon emissions. The platform supports compliance with international standards such as GHG Protocol, ISO 14064, and PAS 2060, ensuring transparency and regulatory alignment.

In addition, some businesses also operate their own AI & IoT systems to inventory greenhouse gases, bringing obvious benefits. Typically, Siemens uses AI and IoT to monitor emissions in manufacturing plants, helping to reduce 20% of CO_2 each year and save millions of dollars in operating costs (ITM, 2019). This confirms the role of big data, machine learning, and IoT in measuring carbon emissions. Carbon measurement systems are very important for the carbon credit market because they not only help ensure transparency and fairness but also increase efficiency in transactions. Accurate data helps businesses make decisions about whether to buy or sell carbon credits effectively, and also affects green technology investment decisions.

Singapore is a leading country in applying big data and AI-Driven carbon footprint system, driven by a strong government commitment to sustainability and a thriving tech ecosystem. With smart solutions embedded in its Green

Plan 2030 and well-established network of data centers, Singapore is integrating Green AI to track carbon emissions and optimize energy efficiency in several sectors like transport, healthcare, and urban planning. Indonesia also has launched ECOVISEA, a free AI-powered carbon footprint tracking system designed for most businesses in Indonesia and Southeast Asia. In short, Singapore and Indonesia, which have more advanced carbon pricing mechanisms, have more integrated Big Data and AI applications for the purpose of monitoring and reporting carbon emissions on a national scale. This is a significant experience for Vietnam. The impact of AI-driven carbon footprint applications in Vietnam is still limited and not yet pervasive, despite the rapid development of these applications.

4.2. Blockchain and online carbon credit platforms

Blockchain is a decentralized ledger technology (DLT) that enables secure, transparent, and tamper-resistant transactions across a distributed network. It operates through a consensus mechanism, ensuring data integrity without the need for a central authority (Cimpan & Crisan, 2025). For the carbon credit market, blockchain can ensure traceable transactions and reduce fraud through smart contracts and online carbon credit platforms.

In the carbon credit market, a smart contract is a self-executing digital contract stored on a blockchain, designed to automate and secure carbon credit transactions. It can verify carbon credit authenticity and prevent double counting and convert carbon credit into digital tokens, allowing seamless trading on blockchain platforms. Smart contracts can automate carbon credit verification and trading, minimizing administrative costs.

Blockchain also enables online carbon credit marketplaces, making trading more accessible and increasing liquidity. These online marketplaces can foster both cap-and-trade and carbon offset mechanisms. Typically, Climate Impact X (CIX) is also a global digital carbon credit exchange that facilitates the trading of high-quality carbon credits with various blockchain applications. It was established in Singapore as a joint venture between Singapore Exchange (SGX), DBS Bank, Standard Chartered, and Temasek. With the big data and digital platform, CIX Marketplace helps businesses buy and retire carbon credits from verified projects; while CIX Auction is a platform enabling price discovery for high-quality carbon credits through competitive bidding. Since its inception, CIX has facilitated the transaction of over 2 million tonnes of carbon credits, and has daily bids and offers averaging 40,000 tonnes (Basar & Basar, 2023).

Vietnam has started exploring blockchain-based carbon trading as part of its efforts to develop a carbon credit market. One notable initiative is the ASEAN Carbon Credit Exchange (CCTPA), launched in Ho Chi Minh City. The platform is exploring blockchain applications to ensure transparency and security in carbon credit transactions. Additionally, CCTPA offers short-term carbon credit lending, assisting businesses needing temporary credits to meet emission targets. Besides, according to Decision No. 232/QD-TTg, Vietnam aims to establish a national carbon market by 2029. With the blockchain application, Vietnam can form an online exchange with global access, such as Climate Impact X (CIX). Linking to Vietnam's Fintech market, blockchain accounts for 13% of the market share, demonstrating strong growth potential (Fintech News, 2020). Thus, the role of blockchain in the formation of carbon credit exchanges and smart contracts in the future has great potential.

4.3. Crowdfunding

Crowdfunding is also a Fintech sector that increases financial capacity and expands access to the carbon market in the future. Crowdfunding is an alternative financing model in which a large and dispersed audience contributes small financial amounts to support a project, typically through internet-based platforms (Alegre & Moleskis, 2016).

In the carbon market, crowdfunding can provide an alternative financing mechanism for green projects and carbon credit projects. It enables individuals and businesses to contribute small financial amounts to support renewable energy, reforestation, and carbon offset programs. Appiah-Otoo and Chen (2023) find that crowdfunding can lead to a measurable reduction in carbon emissions, with a 10% increase in crowdfunding resulting in approximately a 0.1% decrease in CO_2 emissions, particularly when funding surpasses a threshold of $379 million. Additionally, crowdfunding enhances market accessibility, allowing smaller enterprises and local communities to participate in carbon credit trading. However, challenges such as regulatory uncertainties and investor trust remain key factors influencing its effectiveness. In practice, Kickstarter, the global crowdfunding platform, offers Climate Neutral raised $160,106 to help businesses offset their carbon footprint (Kickstarter, 2025).

For the Vietnamese market, crowdfunding accounts for about 4.5% of the Fintech market share in Vietnam (Fintech

News, 2021). Currently, green crowdfunding applications in Vietnam, such as Fundstart, FundingVN, and Firststep, are only focusing on raising funds for environmental and sustainability projects. However, with its strong spread, in the future, this Fintech sector can also attract capital for the carbon market, especially carbon offset. One typical crowdfunding application that helps promote carbon trading mechanisms in Southeast Asian is Nexus for Development. It applied the crowdfunding platforms to provide debt capital to growth-stage enterprises, including those with environmental benefits, like solar mini-grids in Myanmar. This is also an innovative financing channel for carbon projects in Vietnam.

5. CONCLUSION AND RECOMMENDATIONS

Vietnam's Fintech is experiencing rapid growth, driven by increasing demand for sustainable finance and carbon credit trading. Vietnam's Fintech sector is projected to reach $40 billion in transaction value by 2025 (Fintech News, 2021). With applications in big data and AI-driven carbon footprint systems, blockchain and crowdfunding sharply developing, Fintech will strongly contribute to the development of the carbon credit market in the future.

In addition to solutions for improving the legal framework, the article aims at recommendations to promote the role of Fintech in developing the carbon market in Vietnam, for the Vietnamese government and companies. Firstly, the government can provide tax incentives and funding to low-carbon projects where Fintech startups can thrive, while private companies can offer technology-driven solutions like AI-powered carbon footprint analytics and blockchain-based carbon trading platforms. Secondly, fostering cross-sector alliances allows for knowledge-sharing and resource pooling, supporting the operation of the carbon credit exchange in 2029 on schedule and effectively. From the lessons learned from Climate Impact X, the government needs to coordinate cooperation between financial intermediaries (typically banks) and Fintech companies to build a transparent and highly accessible green financial ecosystem for investors. Thirdly, take advantage of cooperation opportunities and support from international organizations in building carbon credit markets and issue various types of carbon credits.

To adapt to the pilot of the Emissions Trading Systems (ETS) in June 2025, businesses should focus on core Fintech applications, such as the AI-Driven Carbon Footprint system to ensure accurate emissions tracking for carbon credit validation. Instead of developing separately, cooperation between Fintech companies such as TPI software or Ecocheck and forestry and agricultural enterprises, the leading sectors in carbon credit exchange in Vietnam, is essential. Promoting Fintech applications in key sectors will be an important premise for widespread application in the future. In addition to traditional fundraising channels, businesses can leverage green finance and crowdfunding platforms in Southeast Asia to support carbon projects. These platforms are not restricted by geographical boundaries, allowing Vietnamese businesses to engage in regional crowdfunding efforts like Nexus or Singapore’s Climate Impact X, which enables them to raise capital while also learning about international standards.

In short, promoting green fintech, cross-sectoral coordination, and leveraging international support are solutions that can strengthen the role of Fintech in Vietnam’s carbon credit market.

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BRIDGING THE GAP BETWEEN ENGLISH FOR TOURISM EDUCATION AND REAL-WORLD WORKPLACE DEMANDS: A MIXED-METHODS STUDY IN VIETNAMESE HIGHER EDUCATION

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ABSTRACT

This study investigates the gap between English language competencies for Tourism education in Vietnamese universities and the language demands of the tourism and hospitality industry. While English for Specific Purposes (ESP) courses are designed to develop professional commu-nication skills, many graduates struggle with real-world workplace English use. Using a mixed-methods approach, the research analyzes data from graduate surveys, interviews with educators and employers, and a review of institutional curricula. Results indicate a mismatch between educational content and job requirements, particularly in pragmatic competence, oral problem-solving, intercultural listening and lack of digital skills training.Contributing factors include outdated curriculum design, minimal experiential learning, and weak industry-education collaboration. The study recommends curriculum reform through task-based learning, internships, and engagement with tourism professionals. Findings aim to inform improvements in ESP pedagogy, enhancing graduate readiness and supporting the sustainable growth of Vietnam's tourism sector.

Keywords: Communicative Competence, Curriculum Design, English for Specific Purposes, Higher Education, Tourism Industry

1. INTRODUCTION

In recent years, English for Specific Purposes (ESP) has become increasingly important in tourism education, especially in non-English-speaking countries like Vietnam. With tourism being a dynamic and globally connected sector, effective English communication is essential for professionals. The arrival of over 12.6 million international visitors in 2023 (Vietnam National Administration of Tourism, 2023) underscores the need for both general and specialized English skills in tourism (Hutchinson & Waters, 1987; Basturkmen, 2010). Despite the widespread adoption of English for Tourism (EFT) in Vietnamese universities, concerns remain about its misalignment with real-world industry needs. Graduates often struggle with tasks like handling complaints, intercultural communication, and spontaneous speech (Gilmore, 2007; Le Vo, Wyatt, & McCullagh, 2016). This is largely due to curricula focused on grammar and textbooks rather than authentic, task-based communication and soft skills (Dat, 2008; Tomlinson, 2012; Koester, 2010).

This study evaluates how well current English for Tourism (EFT) programs in Vietnamese universities align with industry communication needs. It examines three aspects: language competencies emphasized in curricula, real-world linguistic demands in tourism workplaces, and views of graduates and professionals on the relevance of their academic training. To address these dimensions, the study is guided by the following research questions: (1) What English skills are emphasized in EFT programs within Vietnamese higher education institutions? (2) What are the authentic communicative needs of tourism professionals in the workplace? and (3) How do graduates and employers assess the effectiveness of current EFT instruction in preparing students for real-world professional communication?

The findings of this research will contribute to a deeper understanding of the EFT–workplace gap in Vietnam and offer insights for curriculum development, teacher training, and policy reform. By aligning language education more closely with professional requirements, the study seeks to support the development of more competent, confident, and employable tourism graduates in a globally competitive environment.

2. THEORETICAL FRAMEWORK

The present study is grounded in three interrelated theoretical frameworks that inform the analysis of English for Tourism (EFT) education in Vietnam: Communicative Competence Theory, Needs Analysis in English for Specific Purposes (ESP), and Constructive Alignment Theory.

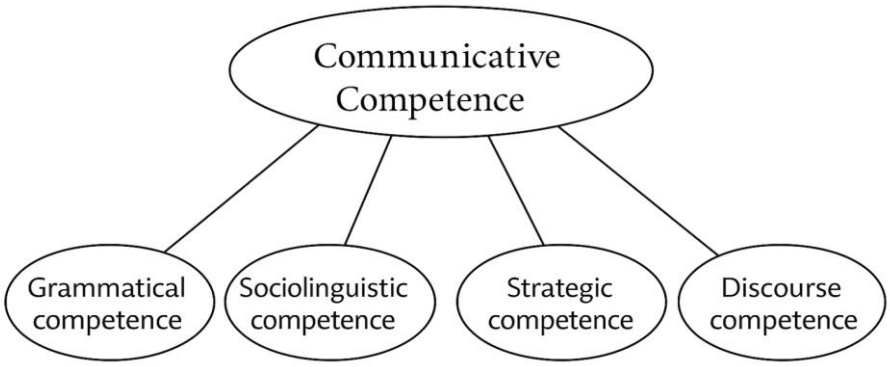


Figure 1. Canale and Swain's model of communicative competence

Canale and Swain (1980) and later Canale (1983) expanded the Communicative Competence Theory, highlighting four components of language proficiency: grammatical competence (mastery of linguistic code), sociolinguistic competence (appropriateness in social contexts), discourse competence (textual cohesion and coherence), and strategic competence (communication strategies). This model speaks to the dire need for more than just the proper teaching of grammar in a language, but also for an emphasis on applicable uses of the language- especially relevant in the interactive and changing world of tourism.

In the field of ESP, Needs Analysis is the component of the curriculum development package. It is Hutchinson and Waters (1987) who first propounded the concepts of target situation analysis (what the learners need to do in the target setting) and present situation analysis (what the learners can do at the time of the assessment). These were further developed by Dudley-Evans and St John in their book in 1998, under a framework which included the lacks, wants, and learning needs of the students, and the learning environment, etc. This multi-angled approach thereby customizes the ESP curricula toward the varied linguistic and communicative requirements relating to the students' future professional setting.

Constructive Alignment Theory, developed by Biggs (1996), argues that there should be alignment between the learning outcomes, teaching activities, and assessment tasks for promoting effective learning. This places the designer of the pedagogy in the center of a triad in which teaching and learning activities must be consistent and focused on helping students achieve the intended learning outcomes. For EFT, it is in this view that the constructive alignment approach ensures that the curriculum does not only cater to the identified needs of the tourism industry but also facilitates competency development through well-designed instructional and assessment strategies.

2.1. English for tourism education in vietnamese higher education

English for Tourism (EFT), a branch of English for Specific Purposes (ESP), equips learners with communication skills for the tourism sector. In Vietnam, EFT is taught in tourism-related programs, but current curricula emphasize vocabulary, reading, and scripted dialogues, with limited authentic use (Nguyen & Pham, 2021). Critics note an overreliance on textbooks and grammar-focused exercises, which fail to develop spontaneous interaction or bridge academic and workplace needs (Lena, Syakirah, & Syamimie, 2019). Industry involvement in curriculum design is minimal, and essential soft skills like negotiation and intercultural communication are often overlooked (Pham & Nguyen, 2022). Experiential learning is also scarce, while many instructors lack tourism or ESP-specific training (Nguyen & Trinh, 2019). Despite these issues, some institutions have begun integrating communicative tasks and project-based learning, signaling positive change (Bui, 2016).

2.2. Real-World English Demands in the Tourism Industry

The service-oriented and multilingual nature of tourism makes effective communication essential. English, as a global lingua franca, supports interactions with international clients, requiring staff to provide information, resolve issues, and engage cross-culturally (Evans, 2013; Blue & Harun, 2003). Oral fluency is key for handling unpredictable situations with confidence and politeness (Nguyen, 2020). Tour guides, for example, must respond in real time while delivering engaging content. Pragmatic competence—using language appropriately in context—is also vital, involving skills like apologizing or negotiating, which grammar-focused teaching often overlooks (Taguchi, 2011).

Listening comprehension is crucial in tourism, where professionals interact with clients speaking diverse and accented English. However, traditional teaching often relies on standardized audio, limiting real-world exposure. Intercultural communicative competence is also vital, as staff must navigate varied cultural norms in handling complaints or requests. Misunderstandings can harm service quality and satisfaction (Nguyen & Trinh, 2019).

Though verbal communication is given much weight, written English is also a significant element in tourist work. Writing letters, responding to online reviews, and managing social media material all require proficient writing and digital communication skills, which are often overlooked in Vietnamese EFT curriculum (Do & Le, 2021).

2.3. Graduate and employer perceptions

A clear gap exists between the English skills taught in EFT programs and those required by the tourism industry. Employers report that graduates often lack spontaneous speaking ability (Bui, 2016; Nguyen, 2020), while graduates feel unprepared due to grammar-heavy, theoretical training. This misalignment stems from the lack of systematic needs analysis in curriculum design. As Dudley-Evans and St John (1998) emphasize, needs analysis is crucial for effective ESP course development, yet it is often superficial in Vietnamese institutions. Bridging this gap requires collaboration among educators, industry stakeholders, and policymakers to ensure curricula align with real-world communication demands.

3. ANALYTICAL FRAMEWORK

This study employs a mixed-methods design to examine the extent to which English for Tourism (EFT) instruction aligns with workplace language demands in Vietnam. Data on 120 recent students who had taken at least one EFT class and then later worked in tourism or hotels were gathered. A survey asked them to rate things on a Likert scale and also to talk about their views on readiness, skill gaps, and job needs. To back these results, more data came from open answers in semi-structured talks with 12 EFT teachers and 10 bosses, looking at needs for speech, how they teach, and problems in teaching. Five schools' plans were also looked at to see how much they matched real talking tasks. The study selected two higher education institutions based on their contrasting academic orientations and contextual settings. One represents a specialized, industry-aligned institution, while the other offers a comprehensive, multidisciplinary approach to tourism education. This sampling approach was designed to capture a range of instructional perspectives. However, it should be noted that both institutions are situated in urban areas, and the study does not account for rural or under-resourced educational contexts, an important direction for future research. The integration of quantitative and qualitative methods provides both breadth and depth in understanding the EFT workplace gap.

The semi-structured interview protocols assured that all questions were asked in the same sequence to help different participants compare all responses for thematic alignment. Key prompts for the employer participants were: *'What communicative English skills do you expect from the new recruits?'* and *'How would you assess the preparedness of the recent graduates to sit in a customer contact situation?'* The teachers were interviewed on pedagogical practices and curriculum-related questions. The questions were: '*What kind of work specific communicative tasks do you include in your teaching of EFT?*' and '*Do you work with the tourism industry when you design teaching materials?*' The above content of the interviews helped maintain comparability across responses from these different stakeholders while allowing for specific details to surface with respect to each case. In addition, syllabi and textbooks from five tourism training institutions were reviewed using a rubric focused on authenticity, skill focus, and alignment with workplace tasks.

Quantitative data were analyzed using descriptive statistics and correlation analysis. Qualitative data from interviews were thematically coded using NVivo software, identifying recurring themes such as mismatch between training and practice, lack of soft skills, and limited real-world application. Curriculum documents were assessed to determine the extent of alignment with communicative and pragmatic workplace demands.

Ethical approval was obtained prior to data collection. All participants gave informed consent, and confidentiality and voluntary participation were strictly upheld throughout the research process.

4. FINDINGS

Curriculum Content versus Workplace Demands

Analysis of survey data and curricular materials indicates a substantial misalignment between English for Tourism

(EFT) instruction and real-world communication demands. As shown in **Table 1**, graduates self-assessed their reading (M = 3.75) and writing (M = 3.42) skills as stronger than speaking (M = 2.98) and listening (M = 3.21), highlighting an academic bias toward literacy-based tasks over oral communication.

Table 1. Self-Perceived English Proficiency in Workplace Contexts

Skill	Mean Score	Standard Deviation
Listening	3.21	0.82
Speaking	2.98	0.90
Reading	3.75	0.69
Writing	3.42	0.74

Curriculum analysis corroborated these results, revealing that while hotel service interactions (100%) and business email writing (83%) were widely covered, scenarios requiring real-time problem-solving, such as handling guest complaints (50%) or emergencies (16%), were underrepresented. Only 33% of syllabi addressed digital communication skills—despite their increasing relevance in contemporary tourism (Evans, 2013; Blue & Harun, 2003).

Graduates also reported significant difficulties in real-life communication tasks, particularly in managing complaints, understanding varied accents, and making spontaneous recommendations, as presented in Table 2.

Table 2. Frequency of Difficulties Encountered in Workplace English Communication (n = 120)

Communicative Task	Often (%)	Sometimes (%)	Rarely (%)
Handling customer complaints	58.3	33.3	8.4
Explaining tour itineraries	26.7	54.2	19.1
Giving spontaneous recommendations	42.5	39.2	18.3
Understanding foreign accents	49.1	41.7	9.2
Writing professional emails	15.0	47.5	37.5

These findings suggest that current curricula do not provide sufficient opportunities for developing oral fluency and communicative adaptability, particularly in high-pressure or unpredictable situations.

Stakeholder Perceptions

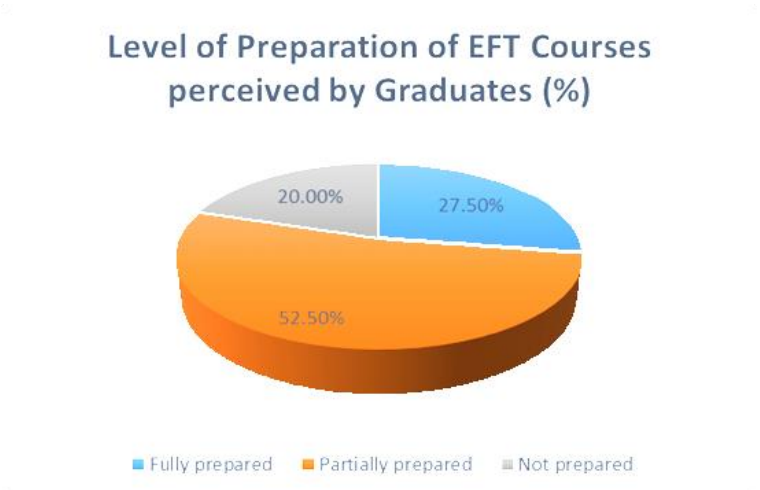


Figure 2. Level of Preparation of EFT Courses perceived by Graduates (n=120)

Graduate responses echoed this gap, with only 27.5% stating that their EFT courses adequately prepared them for workplace communication. A further 52.5% responded "partially," while 20.0% indicated "no." Common criticisms included the overuse of scripted dialogues and grammar drills, with insufficient exposure to real-world tasks. One graduate commented, *"We never practiced handling real customer situations"* (S35).

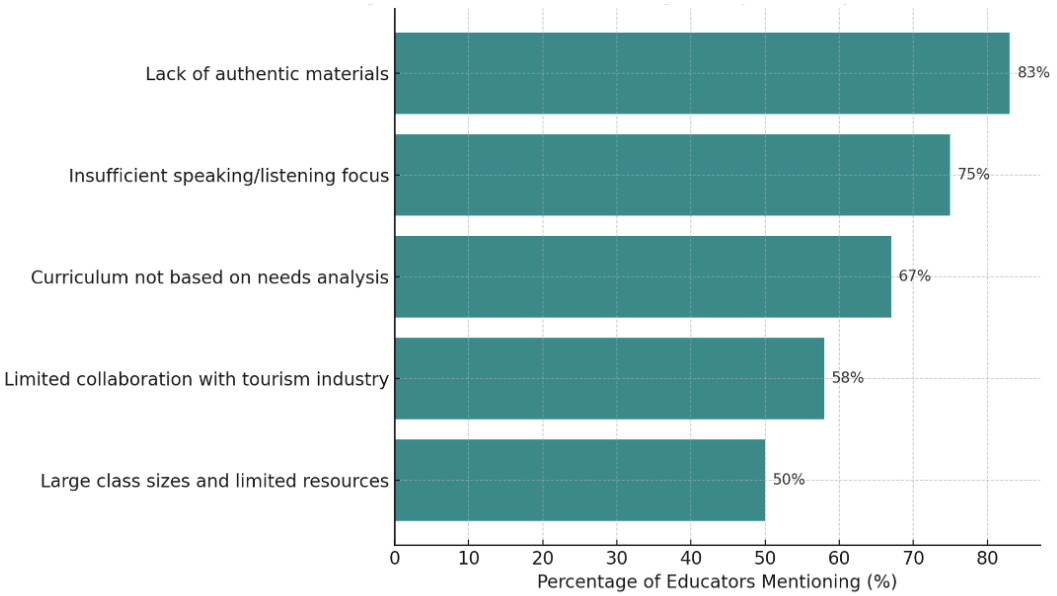


Figure 3. Common challenges report by Educator (n=12)

Educators largely agreed with these concerns. As shown in **Figure 3**, 83% of instructors cited a lack of authentic materials, while 75% highlighted inadequate focus on listening and speaking skills. Other frequently mentioned issues included the absence of needs analysis (67%) and limited collaboration with industry (58%).

These results point to systemic barriers to implementing communicative, learner-centered pedagogy and reflect broader constraints such as large class sizes and institutional rigidity (Hutchinson & Waters, 1987; Biggs, 1996).

Skill Gaps Identified

Employer interviews further confirmed the training–practice mismatch. Only 2 out of 10 employers rated graduate English skills as satisfactory. The majority highlighted deficiencies in oral problem-solving, listening to diverse accents, and real-time interaction. In contrast, grammar and email writing were viewed as relatively stronger areas.

Table 3. Skills Employers Expect vs. Skills Graduates Commonly Possess

Skill Category	Expected by Employers	Common in Graduates
Spontaneous oral communication	✓✓✓	✓
Problem-solving with guests	✓✓✓	✗
Listening to varied accents	✓✓	✗
Writing professional emails	✓✓	✓✓
Grammar accuracy	✓	✓✓✓

Employers stressed the need for responsive, interpersonal communication and expressed frustration with graduates who were competent in grammar but lacked confidence or adaptability when interacting with foreign guests. As one employer noted, *"They're not trained to think on their feet. Tourism is about people, quick responses, and problem-*

solving, rather than filling in grammar worksheets."

Another emerging gap identified by graduates relates to digital communication skills, which are increasingly essential in the modern tourism industry. Tasks such as responding to online reviews, managing booking inquiries via email or chat, and engaging with customers on social media require not only linguistic competence but also digital literacy and professional tone. However, most graduates reported limited or no training in these areas during their EFT courses. As one respondent noted, *"We were never taught how to reply to guest reviews or deal with social media messages professionally" (S47).* This lack of preparation reflects a broader issue: EFT curricula remain largely focused on face-to-face interactions and overlook the growing role of online communication in customer service. Without exposure to these real-world digital tasks, graduates may struggle to meet employer expectations in an increasingly tech-driven service environment.

Recent developments reveal that Thailand has placed greater emphasis than Vietnam on reforming education policies and integrating digital skills training into ESP programs for tourism. Thailand's approach is driven by national strategies such as Education 4.0, which advocate for competency-based learning and the incorporation of digital communication into language instruction. Thai universities actively collaborate with tourism businesses to ensure curricula reflect real-world needs, embedding tasks such as online customer interaction, social media communication, and workplace simulations (Chaovanapricha & Champakaew, 2023). By contrast, Vietnam has not applied a set of unified national standards for English for Tourism (EFT), and while the participation of industry stakeholders in curriculum development has taken place, it has been rather minimal and not regular. As Pham and Nguyen (2022) observe, outdated teaching methods and a lack of emphasis on technology-based communication result in graduates being underprepared for modern tourism demands. This difference thus emphasizes the need for Vietnam to benchmark its progress against regional countries and to take up evidence-based practices from within the ASEAN educational landscape to make its ESP programs more relevant and effective

In summary, findings from multiple sources converge on four critical skill gaps: pragmatic competence, oral problem-solving, intercultural listening and lack of digital skills training. These deficits underscore the urgency of reforming EFT curricula to reflect authentic workplace realities and stakeholder expectations.

5. DISCUSSION

The findings of this study confirm a considerable mismatch between English for Tourism (EFT) instruction in Vietnamese higher education and the communicative requirements of the tourism industry. Although graduates expressed moderate confidence in their reading and writing abilities, their self-assessments in speaking and listening were notably lower (Lertchalermtipakoon, Wongsubun, & Kawinkoonlasate, 2021; Kaewkunha & Sukying, 2021). Their reported difficulties in spontaneous, workplace-based communication suggest underdevelopment in critical dimensions of communicative competence, particularly sociolinguistic, discourse, and strategic competence, as defined by Canale and Swain (1980).

This gap reflects a broader failure to conduct systematic needs analysis in curriculum design, which is essential in ESP pedagogy (Hutchinson & Waters, 1987; Dudley-Evans & St John, 1998). The absence of target situation alignment has led to overemphasis on grammar and controlled written tasks, with limited exposure to authentic, task-based activities such as handling complaints, navigating intercultural communication, or problem-solving under pressure.

Pedagogically, these findings call for a shift toward communicative, task-based instruction. EFT curricula should integrate role-plays, simulations, digital skills training, scenario-based assessments, and workplace-oriented activities that mirror real-world challenges. Instructors require more contextual training and access to authentic materials to facilitate these changes.

At the policy level, stronger collaboration between universities and tourism enterprises is essential. In response to the identified gaps between English for Tourism (EFT) education and workplace communication demands, this study recommends three key policy measures. First, higher education institutions should be mandated to establish Enterprise Advisory Councils that regularly review and align curriculum design with industry needs. Second, a unified national competency framework for EFT should be developed, benchmarked against international standards, and focused on the communicative and digital skills required of tourism professionals. Third, a periodic and institutionalized industry needs

assessment should be implemented to track evolving language demands and inform curriculum updates, teacher training, and program evaluation.

6. CONCLUSION

This study has identified a persistent gap between English for Tourism (EFT) education in Vietnamese higher education and the communicative demands of the tourism industry. While graduates reported moderate competence in reading and writing, they expressed limited confidence in speaking and listening—skills essential for real-time, guest-facing interactions. These findings highlight the continued emphasis on grammar and academic tasks at the expense of communicative competence and workplace readiness.

The study contributes to ESP research by reinforcing the importance of communicative competence (Canale & Swain, 1980) and needs-based curriculum design (Hutchinson & Waters, 1987). It also offers practical insights for educators, institutions, and policymakers seeking to improve graduate employability in tourism. EFT programs should adopt task-based, communicative approaches, integrate authentic materials, and align instruction with workplace scenarios. Stronger collaboration with tourism enterprises is essential, particularly in co-developing curricula and delivering meaningful internships. At the policy level, national standards should prioritize practical skill development and industry input.

Despite the insights generated, this study is not without limitations. Data were collected from a sample of universities in urban Vietnam and may not reflect the diversity of EFT practices across the country, particularly in rural or under-resourced regions. Future research should expand to rural contexts, track graduate outcomes over time, and explore cross-country comparisons within ASEAN. Additionally, emerging trends in digital and sustainable tourism point to new communicative demands that future EFT programs must address.

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THE RELATIONSHIP BETWEEN FINTECH AND CO_2 EMISSIONS IN ASIA: THE MODERATING ROLE OF INCOME INEQUALITY

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ABSTRACT

This study examines the impact of financial technology (Fintech) on CO_2 emissions in nine major Asian economies from 2012 to 2021, with a focus on the moderating role of income inequality. Using a mixed-method approach that combines Generalized Least Squares (GLS), Principal Component Analysis (PCA), and expert interviews, the findings show that Fintech significantly reduces CO_2 emissions. Specifically, a one-unit increase in the Fintech Index corresponds to an 18.2-unit reduction in per capita emissions. However, this effect weakens in countries with high income inequality due to limited digital access among low-income populations. The interaction between Fintech and the Gini coefficient has a positive and significant effect on emissions, indicating that income inequality diminishes the environmental benefits of Fintech. Additionally, GDP and foreign direct investment (FDI) are positively associated with emissions, while renewable energy consumption significantly reduces CO_2 emissions. Expert insights from Vietnam highlight barriers to inclusive green finance, including digital illiteracy and infrastructure gaps. The study contributes empirical evidence on the Fintech-environment nexus and emphasizes that Fintech may be insufficient in reducing CO_2 emissions in Asian countries unless equality, financial inclusion, and supportive green policy frameworks are in place.

Keywords: Asia, CO_2 emissions, digital finance, Fintech, income inequality

1. INTRODUCTION

CO_2 emissions from fossil fuel combustion are widely recognized as the leading cause of climate change. The Asia-Pacific region, which accounts for nearly 50% of global CO_2 emissions, continues to experience rapid industrial expansion driven by carbon-intensive energy systems. This raises urgent concerns about how fast-growing economies in the region can transition toward more sustainable models.

In this context, financial technology (Fintech) has emerged as a potential catalyst for green transformation by promoting sustainable consumption, improving financial inclusion, and enabling efficient allocation of green capital. However, the effectiveness of Fintech in reducing greenhouse gas emissions may be significantly constrained by income inequality. These disparities limit the ability of low-income groups to access digital infrastructure and financial services, thereby weakening the positive environmental impact Fintech could deliver. This study addresses this gap by examining how income inequality influences the relationship between Fintech development and CO_2 emissions. The analysis uses a panel dataset including nine Asian economies - including China, India, Indonesia, Japan, Malaysia, the Philippines, South Korea, Thailand, and Vietnam - from 2012 to 2021. These countries were chosen due to their strategic roles in regional carbon emissions and varying stages of Fintech adoption. The study applies Generalized Least Squares (GLS) regression to address heteroskedasticity commonly observed in macro-panel data. Principal Component Analysis (PCA) is used to construct composite indices for Fintech and economic development, while expert interviews in Vietnam provide practical validation.

This research makes three main contributions. First, it is strengthens empirical studies evaluating the moderating effect of income inequality on the Fintech - environment nexus in Asian economies. Second, it employs a multi-method approach, combining quantitative modeling with qualitative validation. Third, it offers implications to guide Fintech strategies and green development transitions in Asian economies. This paper is structured as follows: Section 1 introduces the study, Section 2 reviews related literature, Section 3 describes the methodology, Section 4 presents the results, Section 5 validates the model, Section 6 offers policy recommendations, and Section 7 concludes the paper.

2. LITERATURE REVIEW

This section reviews the theoretical foundations and empirical evidence on the interrelationships among FinTech development, income inequality, and CO_2 emissions in Asian economies, identifying key mechanisms and gaps.

FinTech's potential environmental impacts are framed by four established theories. The Environmental Kuznets Curve (EKC) and Green Finance Theory together suggest that early economic growth raises emissions and inequality, but as digital-finance tools such as green bonds, concessional credit, and climate funds become available, they can mobilize capital for renewable-energy projects and begin to bend the EKC downward by reducing CO_2 emissions. The Technology–Environmental–Economic–Social Sustainability Theory (T-EESST) further argues that innovations like FinTech only generate meaningful sustainability gains when integrated into inclusive policy frameworks and supportive infrastructure, ensuring green finance truly reaches underserved communities. Additionally, The Digital Financial Inclusion Theory underscores that broadening digital access to financial services reflected in PCA-based FinTech indices enables low-income populations to engage in renewable-energy financing, although this empowerment diminishes as income inequality rises.

Empirical evidence from China shows that FinTech development can significantly reduce pollutant emissions. Ma et al. (2023) apply a city-level fixed-effects model to 2011–2017 data and find that a 1 % increase in FinTech lowers SO_2 emissions by 0.07 % via digital-finance and green-innovation channels. Wen & Liu (2023) report that FinTech adoption reduces SO_2, solid waste, and CO_2 while improving coordination between pollution control and carbon reduction. At the firm level, Wang et al. (2024) show that a 1 % rise in FinTech growth cuts corporate carbon emissions by 2.07 %, driven by easier access to green finance and sustainable-technology patents.

Income inequality shapes renewable-energy consumption through two channels. Through the economic channel, high inequality fosters individualism, consumerism, and short-termism, leading to rent-seeking behavior and intensive use of non-renewable energy, as societies with high Gini lack collective action and environmental sensitivity. Through the political channel, inequality may reflect weak institutions that fail to incentivize efficient environmental investments—thus inhibiting renewable uptake but in some contexts elites leverage their influence to demand stricter green policies, promoting renewables. Khan et al. (2023) further demonstrate that higher inequality raises CO_2 emissions as affluent groups consume energy less efficiently.

Vo et al. (2023) examine 65 countries and find that while FinTech development generally boosts renewable-energy consumption, this positive effect is significantly weakened under high income inequality.

Finally, macro-drivers such as GDP per capita, FDI, population density, and renewable-energy share also influence CO_2 outcomes. In Indonesia, Aripin et al. (2024) show GDP growth and population exert both short- and long-run effects on CO_2, whereas renewable-energy adoption mitigates emissions.

3. METHODOLOGY

3.1. Model

This study investigates the individual effects of Fintech development and income inequality, as well as their interaction effect, on carbon dioxide (CO_2) emissions across nine Asian countries over the period 2012 - 2021. The empirical model is developed following recent literature and is specified as follows:

$$CE_{it} = \alpha + \beta_1 FIN_{it} + \beta_2 FIN_GINI_{it} + \beta_3 FDI_{it} + \beta_4 REC_{it} + \beta_5 GDP_PD_{it} + \varepsilon_{it}$$

where i = 1, 2,...,N denotes the country and t = 1, 2,...,T the year. $CO2_{i,t}$ is the dependent variable, representing per capita CO_2 emissions in country i at time t. The main explanatory variables are the Fintech development index $FIN_{i,t}$ constructed using principal component analysis (PCA), and income inequality $GINI_{i,t}$, measured by the Gini coefficient. The interaction term $FIN\ x\ GINI_{i,t}$ is included to examine whether the impact of Fintech on CO_2 emissions is conditional upon the level of income inequality.

In addition, the model controls for relevant macroeconomic and environmental factors. GDP per capita $GDP_{pc\ i,t}$ reflects the level of economic development; foreign direct investment $FDI_{i,t}$ accounts for international capital flows; and renewable energy consumption $REC_{i,t}$ captures a country's transition toward cleaner energy sources. Country fixed effects

α_i are incorporated to control for unobserved time-invariant characteristics, while ε_i is the idiosyncratic error term.

3.2. Data

We collect data from several authoritative sources, including the World Development Indicators (WDI) of the World Bank, the Standardized World Income Inequality Database (SWIID) from Harvard University for income inequality, and regional Fintech statistical reports for constructing the Fintech index. The final sample includes nine Asian countries-China, India, Indonesia, Japan, Malaysia, the Philippines, South Korea, Thailand, and Vietnam - spanning the period from 2012 to 2021. Table 1 presents the list of countries, while Table 2 provides definitions and sources of all variables used in the analysis.

Our dataset is structured as an unbalanced panel due to data unavailability, particularly on Fintech indicators and the Gini coefficient. This is a common feature in cross-country studies, and we address it using listwise deletion to ensure consistency across observations. All empirical analyses are conducted using Python3, which provides robust techniques for unbalanced panel estimation. The dependent variable is carbon dioxide emissions per capita (metric tons), obtained from WDI. The key independent variable, Fintech development, is proxied by a composite index constructed using principal component analysis (PCA) based on ATM density, internet penetration, and mobile subscriptions. While ATM density may traditionally be associated with conventional banking infrastructure, in emerging Asian economies it still serves as a critical access point to digital financial services. Studies such as Wang et al. (2024) and Ma et al. (2023) have included ATM penetration as a proxy for FinTech access in contexts where mobile banking is not yet fully inclusive. In this study, ATM density complements internet and mobile usage to reflect early-stage digital financial infrastructure, especially in rural or low-income areas, thus capturing the broader scope of financial digitization.

Income inequality is captured by the Gini coefficient, and we include an interaction term (FIN × GINI) to test moderating effects. Control variables include a PCA-based development index (GDP_PD) from GDP per capita and population growth, FDI (% of GDP), and renewable energy consumption (REC). All estimations are conducted in Python 3, using listwise deletion to handle missing values.

Table 2. The descriptions of variables

Variable		Description	Source
Dependent variable			
CO_2 emissions	CO_2	CO_2 emissions per capita (metric tons)	WDI
Independent variables			
Fintech development	FIN	PCA-based composite index of Fintech	
Income inequality	GINI	Gini coefficient of disposable income	SWIID
Interaction term	FIN × GINI	Interaction between Fintech development and income inequality	
Control variables			
Economic development	GDP_PD	PCA-based index combining GDP per capita and population growth rate to proxy for economic development	WDI
Foreign direct investment	FDI	Foreign direct investment inflows (% of GDP)	WDI
Renewable_energy consumption	REC	Renewable energy consumption as a percentage of total final energy consumption	WDI

Source: Author's compilation from WDI, SWIID, and Fintech data.

Table 3. Descriptive statistics

Variable	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
CO_2	5.3	3.9	3.0	0.9	13.0	5.48	-1.02
FIN	35.3	33.0	8.0	0.9	46.5	-2.12	-3.31
GINI	12	12	13,131	1,429	49,145	1.35	3.57
GDP_PD	42.1	10.9	18.8	-3.48	344.1	2.64	5.99
FDI	16.5	15.6	11.6	1.6	37.9	-2.9	-1.46
REC	279	307	136	90	531	-1.24	-0.93

Source: Author's calculation (Python3) using WDI, SWIID, and Fintech data.

3.3. Our empirical estimations

Our empirical approach examines the effect of FinTech development on CO_2 emissions and whether this relationship is moderated by income inequality. We employ the generalized least squares (GLS) method, appropriate for our panel data given the presence of heteroscedasticity and autocorrelation, as confirmed by Breusch-Pagan and Durbin-Watson tests. GLS provides efficient and consistent estimates under these conditions.

To handle multicollinearity and construct composite indices, we use principal component analysis (PCA)**.** The FinTech index is derived from ATM density, internet usage, and mobile subscriptions, while the economic development index (GDP_PD) combines GDP per capita and population growth. A **Hausman test** ($p = 1.0$) confirms no endogeneity bias, supporting the use of GLS without instrumental variables.

In addition, we conduct **structured interviews** with experts from the banking, FinTech, and ESG sectors. These qualitative insights help contextualize the results, especially for the Vietnamese case.

4. RESULTS

4.1. Main regression results

Table 4 presents the results from the GLS regression examining the effects of FinTech development and income inequality on CO_2 emissions across nine Asian countries during 2012–2021. The model demonstrates strong explanatory power, with an R-squared of 0.957, indicating that 95.7% of the variation in CO_2 emissions is captured by the included variables.

Key findings are summarized as follows:

– FinTech development (FIN) is negatively associated with CO_2 emissions and statistically significant at the 1% level ($\beta = -18.222$), supporting Hypothesis 1. This suggests that FinTech may contribute to emissions reduction by enhancing digital access to finance, promoting green financial products, and improving capital allocation efficiency.

– The interaction term (FIN×GINI) is positive and also significant at the 1% level ($\beta = +0.0525$), confirming Hypothesis 2. This implies that income inequality weakens the environmental benefits of FinTech, likely due to limited digital access among disadvantaged populations.

– GDP_PD, a proxy for economic development, exerts a positive and significant effect on emissions, consistent with the Environmental Kuznets Curve framework in early stages of growth.

– Foreign direct investment (FDI) is positively related to CO_2 emissions, providing evidence in support of the Pollution Haven Hypothesis.

– Renewable energy consumption (REC) has a significant negative effect on emissions, highlighting the role of clean energy in environmental mitigation strategies.

Table 4. GLS Regression Results: CO_2 Emissions, FinTech, and Income Inequality

Variable	Coefficient	Std. Error	t-Statistic	p-value	95% CI
Constant	10.1235	0.201	50.272	***	[9.723, 10.524]
FIN	–18.2220	4.982	–3.658	***	[–27.183, –9.261]
FIN × GINI	0.0525	0.013	4.026	***	[0.027, 0.078]
FDI	6.13×10^{-12}	1.24×10^{-12}	4.952	***	[3.67e–12, 8.59e–12]
REC	–0.2612	0.008	–30.876	***	[–0.278, –0.244]
GDP_PD	1.0684	0.088	12.176	***	[0.894, 1.242]
Model Fit					
R-squared			0.957		
Adj. R-squared			0.954		
F-statistic			369.6		
AIC			224.5		
BIC			239.5		

*Significance levels: *** $p < 0.01$*

Source: Author's estimation using GLS on panel data (Python3, 2012–2021)

4.2. Qualitative insights

To complement the empirical results and better understand the mechanisms behind the relationship between Fintech, income inequality, and CO_2 emissions, we conducted expert interviews with professionals in the banking, Fintech, and ESG sectors in Vietnam. The interviews offer valuable insights into the practical implementation and social reception of digital financial tools and green finance initiatives.

Experts agreed that Fintech plays an increasingly important role in reducing CO_2 emissions by digitizing financial services, thereby lowering the use of paper and streamlining loan processes. For instance, the transition from traditional paperwork-intensive loan applications to digital platforms such as Smartbanking or VCB Digibank has led to reduced demand for physical documentation and associated environmental costs. As noted by Tran Cong Danh, an expert from BIDV, Fintech applications such as BIDV's SmartBanking have transformed traditional banking processes by enabling unsecured loans to be processed online, with funds disbursed within minutes. He emphasized that *"The shift toward minimizing paperwork and intermediaries in loan procedures helps reduce paper consumption, preserve green spaces, and ultimately lower carbon emissions"*. However, concerns were raised about the potential indirect emissions linked to the production of electronic devices and infrastructure needed for Fintech operations. Regarding income inequality, interviewees noted that while Fintech platforms offer broader access to financial services, such benefits are not equally distributed. Low-income populations still face barriers such as digital illiteracy, lack of access to smart devices, and limited financial education. Tran Cong Danh further noted that while Fintech holds promise for narrowing wealth gaps by bringing investment opportunities closer to individuals, structural barriers remain in Vietnam. He explained that *"Although the conditions for economic advancement are becoming more accessible, many people are still unable to fully utilize them due to limitations in mindset, investment knowledge, and financial literacy. As a result, the gap between the rich and the poor remains significant"*. As a result, the positive environmental effects of Fintech can be diminished in contexts with high income inequality.

Importantly, experts emphasized the role of financial education and environmental awareness. They argued that Fintech can only achieve its full environmental potential if accompanied by widespread digital inclusion, sustainability-focused communication, and inclusive financial policies. In addition, he highlighted BIDV's strategic commitment to sustainability, stating that *"Our initiatives include green credit packages, alignment with ESG trends, and a clear*

roadmap toward Net Zero." These developments reflect the growing role of Fintech in supporting environmental and social governance objectives in the Vietnamese banking sector.

4.3. Country-Level Comparison: Indonesia vs. Japan

To explore how income inequality shapes the FinTech-environment relationship, we compare two contrasting cases: Indonesia (Gini = 46.23) and Japan (Gini = 1.03). These countries differ in both inequality levels and digital infrastructure, offering a useful basis for comparison. Using the same GLS specification, we re-estimate the model separately for each country over 2012-2021. Results are reported in Table 5.

Table 5. Summarizes GLS on split samples

Variable	Indonesia (Highest GINI)	Japan (Lowest GINI)
FinTech (FIN)	- 8.471	- 1.229
FIN × GINI	0.181	1.087
FDI	-3.07×10^{-12}	-3.41×10^{-12}
REC	- 0.061**	- 0.498***
GDP_PD	- 1.175	- 0.296
R-squared	0.948	0.992

*Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1*

Source: Author's calculation using GLS on split samples ((Python3)

The coefficient of FinTech (FIN) is negative in both Indonesia and Japan, suggesting its potential role in reducing CO_2 emissions, though the effects are not statistically significant-likely due to limited sample size or structural differences. The interaction term (FIN × GINI) is positive in both cases, supporting the hypothesis that income inequality weakens the environmental benefits of FinTech, yet again without statistical significance.

In contrast, renewable energy consumption (REC) significantly reduces emissions in both countries, with a much stronger effect in Japan (-0.498 vs. -0.061), indicating that clean energy policies may be more effective than FinTech in isolation - especially in digitally fragmented economies.

Although FinTech-related coefficients are insignificant, the gap in model fit (R^2 = 0.948 vs. 0.992) suggests that FinTech may be more impactful in countries with greater digital equity. These findings reinforce the conclusion that income inequality poses a key barrier to FinTech's environmental potential and underline the need for context-specific digital policy design.

4.4. Robustness Check: Alternative Proxy for FinTech

To validate the robustness of our findings, we construct an alternative FinTech index using principal component analysis (PCA), following the approach of Andriana et al. (2024). The index is based on three standardized indicators: Account ownership at a financial institution or with a mobile money service provider (% of population ages 15+), Individuals using the Internet, and Mobile cellular subscription per 100 people, drawn from World Bank sources for 2011-2021.

The first principal component (PC1), denoted as FIN, captures the shared variance across these variables and serves as a comprehensive proxy for FinTech development. This approach reflects both access to and usage of digital financial services, addressing limitations of infrastructure-based measures.

We re-estimate the baseline GLS model using this FIN index. As shown in Table 6, FinTech remains negatively associated with CO_2 emissions (β = -1.091, ***), while the interaction with income inequality is positive and significant (β = 0.032, ***). The model fit is strong (R^2 = 0.956), supporting the robustness of our main conclusion.

Table 6. Robustness Check Using PCA-Based FinTech Index

Variable	Coefficient	Std. Error	t-Statistic	Significance
Constant	10.1898	0.205	49.776	***
FIN	- 1.0911	0.257	- 4.244	***
FIN × GINI	0.0321	0.007	4.625	***
FDI	6.45×10^{-12}	1.26×10^{-12}	5.125	***
REC	- 0.2670	0.009	- 30.452	***
GDP_PD	1.1189	0.090	12.431	***
R-squared	0.956	-	-	-

*Significance levels: *** p < 0.01*

Source: Author's estimation using GLS and PCA-based FinTech index (Python3).

These findings validate the stability of our results across alternative FinTech constructions. The use of a PCA-based index-rooted in multidimensional digital inclusion-strengthens the empirical credibility of the study and mitigates concerns about potential bias from infrastructure - only proxies. In doing so, we provide further evidence that digital financial development, when inclusively adopted, can play a meaningful role in promoting environmental sustainability.

5. MODEL VALIDATION

To ensure the reliability of our estimation approach, we conduct a series of diagnostic tests to validate model assumptions and justify the use of generalized least squares (GLS) instead of ordinary least squares (OLS).

First, we test for heteroskedasticity using the Breusch-Pagan test. The result yields a p-value of 0.0179, indicating rejection of the null hypothesis of homoskedastic errors. This suggests that the error variance is not constant across observations, violating a core OLS assumption. Second, the Durbin-Watson test statistic is 0.6609, far below the threshold of 1.5. This indicates severe positive autocorrelation in the residuals, further violating classical OLS assumptions. These two findings imply that OLS estimators, while unbiased, are inefficient, and that the standard errors are unreliable, leading to potential bias in hypothesis testing. To address these issues, we adopt the GLS estimation method, which adjusts for heteroskedasticity and autocorrelation by reweighting observations based on their estimated error variance structure. This method is particularly appropriate for macro panel data with structural heterogeneity and temporal dependence.

Additionally, we perform the Hausman specification test to assess the potential endogeneity of independent variables. The test returns a p-value of 1.0, suggesting no significant difference between the fixed-effects and random-effects estimators. Thus, we find no evidence of endogeneity, and the GLS estimator remains consistent and efficient without the need for instrumental variables.

6. POLICY RECOMMENDATIONS

To fully leverage the environmental benefits of FinTech, policymakers should adopt a dual-focus approach: promoting technological innovation while ensuring inclusive access. Firstly, investing in digital infrastructure - particularly in rural and low-income areas - is essential to bridge the access gap and enable widespread adoption of FinTech services. Secondly, financial and digital literacy programs should target underserved populations to empower them with the skills needed to engage in sustainable financial behaviors and benefit from digital financial tools. Thirdly, governments should integrate FinTech into national climate finance strategies through mechanisms like green credit programs, low-interest digital loans for clean energy, or mobile-based savings platforms for climate adaptation. Public-private partnerships and incentive structures (e.g., tax incentives, innovation grants) can further stimulate the development of environmentally focused FinTech solutions.

Lastly, regulatory frameworks must evolve to ensure sustainability, transparency, and consumer protection. This

includes mandatory ESG disclosures for FinTech firms, clear standards for green digital products, and protections for vulnerable users. Cross - ministerial coordination - linking finance, environment, and digital governance - is critical to building an ecosystem where FinTech contributes meaningfully to climate goals while reducing socio-economic disparities.

7. CONCLUSIONS

This study provides strong empirical evidence that FinTech development is associated with lower CO_2 emissions in Asian economies. However, this positive impact is significantly weakened in contexts of high income inequality, where digital exclusion limits access to green financial innovations. Through GLS estimation, PCA-based indices, and expert interviews, we demonstrate that the relationship between FinTech and environmental outcomes is conditional - FinTech alone is not a silver bullet but requires enabling conditions.

Robustness checks, including an alternative FinTech index and a country-level comparison between Japan and Indonesia, support this conclusion: FinTech is more effective in promoting environmental sustainability when digital access is equitable and institutions are supportive. While the study contributes to extending the Environmental Kuznets Curve framework by adding a digital dimension, it also acknowledges key limitations - such as reliance on national-level data and a single environmental indicator. Future research should consider more granular data, additional sustainability metrics, and non-linear modeling techniques.

In summary, FinTech holds considerable promise for enabling a low-carbon transition in Asia. Yet, its success hinges on equitable access, inclusive policy design, and strong institutional support to ensure that its environmental benefits are both scalable and sustainable.

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THE IMPACT OF CARBON CREDIT TRADING PLATFORM: A STAKEHOLDER-BASED ANALYSIS WITH INTERNATIONAL CASE STUDIES

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ABSTRACT

Recently, the Vietnamese Government released a draft decree on the establishment of a domestic carbon credit trading platform. This marks a significant step in reaffirming the country's commitment to controlling greenhouse gas emissions and achieving its net-zero target by 2050. However, this initial draft also reveals several limitations, many of which could directly impact key stakeholders involved in the carbon market. This study analyzes the proposed structure and key features of the carbon exchange as outlined in the draft, identifies potential challenges, and examines how similar issues have been addressed in carbon markets of other countries. By doing so, the research aims to provide constructive insights to support the development of a more robust foundation for Vietnam's carbon trading platform and offer practical guidance for stakeholders preparing to engage in the domestic carbon market.

Keywords: Carbon credit, Vietnam carbon market, trading system, stakeholder challenges.

1. INTRODUCTION OF CARBON CREDIT TRADING PLATFORM

In the context of climate change and global warming, decarbonization among enterprises is regarded as a key solution to tackle in time. In which, the carbon credit market is long a preferred politic-economic market-based tool for attacking climate change and regarded as a step towards green environment.When integrated with smart grid technology, Carbon credit trading systems emerged to create financial incentives for reducing emissions and help accelerate the transition to cleaner energy. To be specific, the carbon credit exchange platform is a trading system that allows organizations to buy and sell the right to emit greenhouse gases, specifically CO2. Companies or individuals can use the carbon market to offset greenhouse gas emissions by purchasing carbon credits from entities that remove or reduce greenhouse gas emissions.

In the world, the origin of carbon credit trading platform derived from carbon market mechanisms under the 1997 Kyoto Protocol – the first legally binding agreement for developed countries to reduce greenhouse gas emission. In fact, the scientific and legal foundations for global climate policy were established early through the First Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 1990) and the United Nations Framework Convention on Climate Change (UNFCCC, 1992).

In the Kyoto Protocol, three main mechanisms were implemented to promote the international carbon market: the Clean Development Mechanism (CDM), the Joint Implementation Mechanism (JI), and the Emissions Trading Mechanism (IET). On that basis, the European Union pioneered the construction and operation of the EU Emissions Trading System (EU-ETS) since 2005, becoming the first and largest official carbon market in the world. In parallel with international compliance mechanisms, since 2000, a voluntary carbon market has also been established to support emission reduction projects and promote sustainable development, with prominent standards such as the Gold Standard (GS) and the Verified Carbon Standard (VCS).

In Vietnam, the term "carbon credit" has long been mentioned as Vietnam is assessed by experts and international partners as one of the countries with great potential for reducing greenhouse gas emissions and creating carbon credits.

The government's commitment to carbon credits has been further strengthened by Vietnam's pledge to achieve net-zero emissions by 2050, as declared at the COP26 Summit in Glasgow, Scotland, United Kingdom, and reaffirmed through its determination to join global efforts in combating climate change at COP28 held in Dubai in December 2023. According to the roadmap outlined in Decision 232/QĐ-TTg (January 24, 2025), Vietnam specified the plan to establish

a centralized carbon market aligned with market principles under State management and monitor. In line with this, a draft decree on the domestic carbon trading platform was issued on March 25, 2023.

Domestic research has also provided valuable recommendations to the government during the drafting of the national carbon exchange roadmap. These include lessons learned from other countries in operating domestic carbon markets, particularly in legal frameworks, as well as studies on the establishment and operation of an international carbon credit depository and trading center, connected with Vietnam's national carbon credit exchange. However, most of these studies were conducted prior to the release of the draft framework for Vietnam's carbon exchange and have yet to address the perspectives of market participants or assess the potential impacts on involved stakeholders.

2. Research Methodology

This study will employ a combination of methods, including:

First, a qualitative research approach, involving the synthesis of secondary sources, policy reports, and international case comparisons

Second, case selection criteria based on relevance and applicability, focusing on systems such as the EU ETS, Korea, India and Canada

Last, stakeholder-based analysis to examine the roles, interests, and interactions of key actors involved in carbon market development

3. FINDINGS AND DISCUSSION

3.1 Summary of the Draft Pilot Carbon Credit Trading Platform in Vietnam

On March 25, in order to carry out the assigned tasks under Decision No. 232/QD-TTg dated January 24, 2025 of the Prime Minister on approving the Project on Establishment and Development of the Carbon Market in Vietnam, the Ministry of Finance drafted a Decree on the domestic carbon trading floor, expected to be piloted in the period 2025–2028.

This is considered the next step in the roadmap for implementing the previously proposed plan, according to Decree No. 06/2022/ND-CP dated January 7, 2022 of the Government, which stipulates that the exchange of greenhouse gas emission quotas and carbon credits will be carried out through the trading floor.

Illustration of proposed mechanism of carbon credit trading on the exchange is as follows:

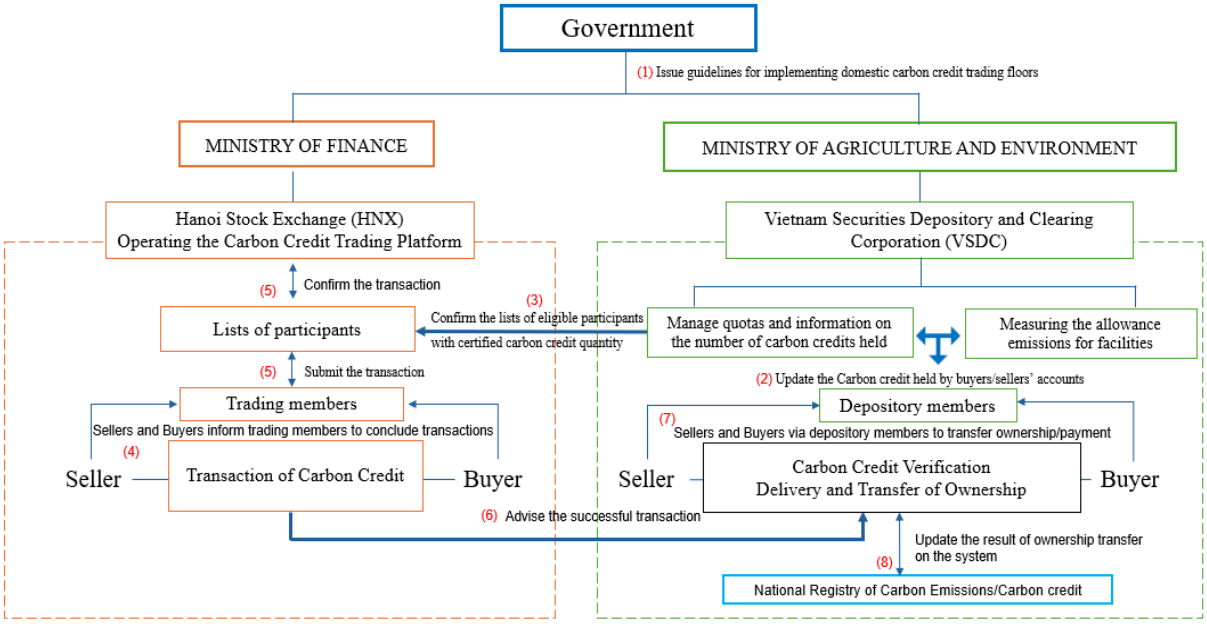


Diagram: Proposed process for carbon trading

(Source: summarized by authors)

From there, under this draft, the Government has drafted a development roadmap for the domestic carbon credit trading floor with the participation of the Ministry of Finance and the Ministry of Agriculture and Environment and Natural Resources with some of the following characteristics:

Firstly, while there are two types of carbon markets in the world: Compliance carbon markets (CCM) and Voluntary Carbon Market (VCM), Vietnam combined both

A compliance carbon market (CCM) is a market where greenhouse gas emissions allowances and some carbon credits are traded to help businesses meet their legal obligations to reduce greenhouse gas emissions. In contrast, Voluntary carbon markets (VCM), are a form of transnational private governance where credit buyers can purchase carbon credits to meet environmental policies, reducing their carbon footprint towards their self-declared Net Zero targets without the obligation of a carbon tax or any penalty if they do not participate.

For Vietnam, the Carbon Market is understood as a combination of these two forms. Specifically, according to Article 6 of this draft, referring to the Law on Environmental Protection, Decree No. 06/2022/ND-CP, and Decision No. 232/QD-TTg, there are two main types of commodities traded on the carbon market in Vietnam: (i) GHG Emission Allowances (allocated to regulated facilities) and (ii) Carbon Credits (certified for trading; including domestic credits and international credits from CDM, JCM, and Article 6 of the Paris Agreement). Thus, Vietnam is building a flexible carbon market platform that allows companies with allocated quotas and other volunteer organizations with needs to trade, exchange, and buy and sell on the exchange. This platform has the inherited characteristics of the Cap-and-Trade system, for example California Cap and Trade system. However, Vietnam carbon credit trading platform is more open to volunteering companies by allowing without limitations to both trading emission allowances and other eligible credits agreed by Vietnam government.

Table: Comparison between Vietnam carbon credit trading platform and California Cap and Trade system

Aspect	Vietnam carbon credit trading platform	California Cap and Trade system
Market model	Hybrid: Combines cap-and-trade for regulated entities with a platform for participants to trade emission allowances, buy additional ones, or use eligible credits (e.g., CDM, JCM, Article 6).	Hybrid: cap-and-trade Some covered entities will be allocated some allowances and will be able to buy additional allowances at auction, purchase allowances from others, or purchase offset credits.
Stage	Pilot phase (2025); full launch (2028)	Fully operational since 2013
Participants	Both compliance and voluntary entities	Compliance entities only
Accepted credits	Broad: CDM, JCM, Article 6, possibly voluntary credits	Limited: only certain offset types, max 4% usage
Trading platform	National carbon exchange under development	Managed by CARB via WCI

(Source: summarized by authors)

Second, Carbon market in Vietnam is limited regarding the international transfer

At the time of issuance, the draft Decree of the Ministry of Finance only focused on regulating the trading, depository and payment activities related to greenhouse gas emission quotas and carbon credits on the domestic carbon exchange. This scope is consistent with the objectives of the 2025–2028 (pilot phase) as stipulated in Decision 232/QD-TTg, that is:

- During this phase, only the domestic exchange will be operated on a pilot basis, and international transfers will not be officially implemented.

- The Ministry of Natural Resources and Environment is assigned to preside over the study and propose regulations on the transfer of carbon credits to foreign partners during the pilot phase.

From 2029 onwards (official phase): The connection of the domestic market with regional and international markets will be considered, based on the results of the pilot assessment and socio-economic impacts. Therefore, the Ministry of Finance limits the draft Decree to the scope of domestic trading floors, not regulating international trading activities.

Third, the operation of the Carbon Exchange is formed with the joint participation of the two ministries of finance and the ministry of agriculture and environment.

The clear division of roles between ministries and affiliated units such as the Hanoi Stock Exchange and the Vietnam Securities Depository and Clearing Corporation helps ensure transparency in carbon market management. However, this organization also creates invisible barriers to synchronization and integration in market operations.

Specifically, according to current regulations, carbon transactions are conducted through the system of the Vietnam Securities Depository and the payment bank using the instant payment method, meaning that the transfer of credits or quotas is carried out simultaneously with the payment of money, as soon as both parties have sufficient assets in their accounts. However, this process has not yet mentioned the integration of digital transformation (DX), the use of shared data, or real-time reporting—the core elements for building an effective, transparent, and modern market surveillance system.

In addition, in Article 6, Section 2.3 of the draft Decree, the Ministry of Finance proposes to allow credits and quotas to be removed from the trading system in certain cases such as maturing commodities or situations specified by the Ministry of Natural Resources and Environment (MONRE), such as forest fires or voluntary offsets.

3.2. The impact of carbon credit trading on participants

3.2.1 To trading participants

The establishment and operation of a carbon credit trading platform has far-reaching implications for stakeholders in the carbon ecosystem. For each individual or organization participating as a buyer/seller, the above limiting features of the trading platform will affect them in different ways.

To Enterprises allocated emission quotas - Buying or Selling Role

The Ministry of Natural Resources and Environment said that, according to the provisions of Clause 4, Article 7 and Clause 2, Article 12 of Decree No. 06/2022/ND-CP, greenhouse gas emission facilities subject to the provisions of Clause 1, Article 5 will be allocated emission quotas in the period 2026–2030. Specifically, these are facilities with large emissions, from 3,000 tons of CO_2 equivalent/year or more (or from 1,000 tons for some specific industries), on the list of industries that must inventory greenhouse gases according to the Prime Minister's regulations.

A company with high emissions can buy quotas from a company with low emissions. If the carbon price is high, the company can be encouraged by investments in emission reduction. However, when businesses participating in the trading of excess quotas are managed by many different agencies, in addition to the operating costs of the business, they face hidden costs when participating in the exchange.

For small businesses emitting less than 1,000 tCO_2 per year, participating in carbon credit trading presents significant hidden costs. These include high upfront investments in monitoring and reporting technologies, expenses for project development and registration, and ongoing costs for carbon accounting. If the purchase of only a small volume of credits requires SMEs to first spend considerable resources on emissions inventory, registration, and transaction procedures, their motivation to engage in the market may decline. On the supply side, developing a carbon credit project can take a company approximately 18 months for a pre-feasibility study, 2–3 years for implementation, and another 6 months for emissions inventory. For SMEs, such a lengthy process combined with additional contingency costs can discourage participating in the exchange as it is economically unviable, especially when dealing with a small volume of credits at the beginning phase of the project.

Obstacle 1: Participants in carbon credit trading must bear the costs and administrative obligations related to registration on the exchange when participating in credit trading activities.

To Carbon Credit Traders - Buying or Selling Role: "Carbon offsets" were initially introduced under the 1997 Kyoto Protocol, laying the groundwork for the development of both voluntary and regulatory (compliance) carbon markets in subsequent years. Carbon credit traders are individuals, companies, or organizations that buy and sell carbon credits in the carbon market—either to comply with emissions regulations or to make a profit.

To Voluntary Participating Businesses - Buying Role Instead of mandatory quotas in government compliance programs, companies and individuals can either invest in own carbon credit projects, partner up directly with project

developers, or purchase spot carbon credits on marketplaces, leading to different levels of engagement in the carbon credit value chain.

However, Vietnam's domestic carbon trading platform may pose certain difficulties for these two entities as the mechanism for transferring credits abroad is not yet seamless. On the other hand, they face pressure from countries and regions that have implemented carbon taxes such as Carbon Border Adjustment Mechanisms (CBAMs) - meaning that carbon credits that businesses buy and sell are limited by domestic factors and will not be recognized. Conversely, if Vietnam has an ETS that meets EU standards, CBAMs will not be applied. After 2028, the impact may become more evident as the European Union (EU)'s Carbon Border Adjustment Mechanism (CBAM) is fully enforced. Vietnamese businesses will likely face significant challenges, particularly in high-emission export sectors such as steel, cement, aluminum, and fertilizer. These companies are also subject to greenhouse gas (GHG) inventory requirements and are expected to be the primary participants in the domestic carbon market. If they must comply with both the CBAM and domestic emission quota obligations through trading, the dual pressure could increase costs and become a bottleneck to participation. As a result, the future situation calls for the Vietnamese government to establish a coordinated mechanism to support integration and alignment.

Obstacle 2: Due to the lack of international links, domestic exchange participants may have difficulty transferring credits abroad or being recognized by foreign institutions, thus reducing the overall attractiveness of the platform.

3.2.2 To Carbon project developers and Intermediary organizations (trading centers, carbon banks...)

Investors and financial institutions must carefully assess the returns and market risks when participating in domestic carbon trading. To invest in projects, they need to verify the legality of the project and cross-check data with the Vietnam Securities Depository and Clearing Corporation (VSDC), which operates under the Ministry of Natural Resources and Environment.

Project Developer/Investor (Credit Provider) Project developers are individuals or organizations that aim to develop emission reduction projects. Like in other industries, project developers scope out the projects, file documents to get them registered and certified, obtain funding, physically create the project, and eventually sell them to the project owners.

As the domestic carbon trading system is only in the pilot phase, vulnerabilities and fraudulent behavior may arise from perverse incentives and lax monitoring processes. Some project developers intentionally inflate emissions before project implementation to raise the assumed baseline in order to earn more carbon credits, especially in developing countries where the cost of destruction is low but the value of the credits received is very high. Larry Lohmann highlighted widespread fraud in the EU ETS and offset markets, partly due to false claims of additionality—many projects received credits despite being implemented regardless of carbon funding, leading to credits that did not reflect real emission reductions. Faced with such inaccurate (outdated) or easily manipulated information, both investors and joint developers need to check and verify the credits of the projects they choose to buy on the exchange. When trading on the system, taking advantage of price differences at different times or project information traceability are also mentioned as problems encountered by carbon exchanges on platform.

Obstacle 3: Intermediary organizations investing in carbon projects may face challenges in promptly obtaining and verifying project documentation, particularly when changes in project ownership occur and affect documentation flow.

3.2.3 To Government and policy makers

Carbon exchange platform is a product that combines science, technology, and practical environmental protection projects. Technology brings significant advantages to the carbon credit market; in which, advanced data-driven tools are needed to enhance the readability of blockchain transaction records and provide actionable insights for decision-makers. Implementing real-time updates could serve as an effective solution to ensure consistent data synchronization on the trading platform, replacing the currently proposed "within one-day" reporting period.

On the other hand, not only government and policy makers might face with technological barriers but also other stakeholders that need guidance from government side.

Currently, these responsibilities are handled by the Ministry of Finance through the Hanoi Stock Exchange. However,

in the future, the involvement of relevant technology ministries will be crucial to ensure the system's efficiency, transparency, and alignment with global digital standards.

Obstacle 4: Entities responsible for emissions control, especially those allocated emission quotas, must take the initiative to conduct regular emissions inventories to ensure timely updates on the exchange, which may increase their operational burden.

3.3 Comparison with international cases

Table: Comparison between Vietnam Carbon credit trading platforms and international cases

Criteria	EU ETS	Canada OBPS	India ETS (Planned)	Korea ETS	Vietnam Carbon credit platform
Scope of Application	Energy, industry, aviation, maritime (within EEA)	Large industrial sectors: power, manufacturing, mining	Power, steel, cement, fertilizer, aluminum... (initial sectors)	Energy, industry, buildings, waste, transport	Open to Enterprises allocated emission quotas and volunteer
Participation Cost (Exchange Fees)	Transaction and auction fees on EEX/ICE; regulated auction costs	Mostly bilateral credit transfers; no national exchange, minimal fees	National carbon market being developed; fees not yet disclosed	Trading via Korea Exchange (KRX); fixed transaction fees	Under development. Exchange fee to be decided by government
Penalties and Sanctions	€100/tCO_2 not surrendered + must make up deficit	CAD 200/tCO_2 for non-compliance	Expected to include monetary fines and trading restrictions	Up to 3× average market price per missing allowance	Not specified in the current draft of carbon credit trading platform
Third party in MRV	Annual reporting 3rd-party verification under EU MRV rules	ISO 14064-aligned MRV Third-party verification	Based on PAT and REC experience Third-party verification expected	Annual reporting Third-party verification Government oversight	Governed by entities under 2 Ministries
Business Support	Free allocation, Innovation Fund, Modernisation Fund	Surplus credits, reinvestment via Climate Action Incentive Fund	Technical assistance, capacity building, World Bank & UNDP partnerships	Free allowances, technical support	Free allowances

Source: summarized by authors

India: How cost of carbon credit trading platform be governed

The role of the exchange is to facilitate the buying and selling of carbon credits, while ensuring the security and transparency of each transaction. In India, the MCX Exchange – headquartered in Mumbai and launched in November 2003 – is an electronic multi-commodity futures exchange, set up to facilitate online trading, clearing and settlement for the futures market across the country. Access to the exchange is limited to members or holders of trading rights. Each transaction is subject to a fee, which can be a fixed amount or a percentage of the transaction value. Both membership and transaction fees can be negotiated depending on the transaction volume – the larger the volume, the lower the cost per transaction. Exchanges are also monitored for price distortion or market manipulation. The trading system operates

on a dual auction mechanism, where supply and demand meet in a centralized market, operated online or offline. Transactions are matched when buyers and sellers agree on a common price, thereby increasing transparency and reducing the risk of price manipulation.

In Vietnam, securities companies under the supervision of the Hanoi Stock Exchange. Vietnam needs to clearly disclose costs such as membership fees, transaction fees, and carbon credit registration fees so that businesses can proactively calculate hidden costs and avoid manipulation. In the context of encouraging companies to participate in trading on the exchange, Vietnam can consider exempting some transaction fees in the early stages as a recommended policy. In addition, it is necessary to apply a transparent auction mechanism and closely monitor to avoid price manipulation.

Europe ETS: the relation between domestic and other nations' platform

Since 1 January 2020, the Swiss ETS has been officially linked to the European Union ETS after 10 years of negotiations and regulatory adjustments. Although there are still some differences between the two systems, such as the Swiss ETS does not apply the Market Stability Reserve and each side conducts its own auctions due to EU legal restrictions on Swiss permit auctions, this link allows organizations in both systems to use each other's emission permits to comply with regulations.

Vietnam could explore a similar approach to enhance market liquidity and offer businesses a broader range of trading options. Integrating both domestic initiatives and international cooperation would be a forward-looking solution to boost the attractiveness and functionality of the carbon credit exchange platform for participating organizations.

Korea ETS: Pressure on SMEs, the role of technical support from government

Prior to the implementation of the K-ETS, Korea had implemented the Target Management System (TMS): TMS since 2012 to collect emissions data and train the Monitoring, Reporting and Verification (MRV) process, which laid the foundation for the K-ETS. The MRVsystem managed by the Ministry of Knowledge Economy (MKE) is the main tool for monitoring energy-consuming enterprises. The MRV system is a mechanism for managing and controlling greenhouse gas (GHG) emissions to ensure that enterprises report their emissions honestly and accurately, thereby helping the government evaluate and effectively manage the emission reduction process.

In this study, technical support from the government was highly appreciated by companies because it helped improve energy-saving capacity. Thus, the application of science and technology with guidance from the government will help reduce pressure on businesses, especially small and medium enterprises. This initiative should be further operated in Vietnam as a new-comer.

Canada: The role of transparent audit and anti-fraud measures

Carbon offsets are bought and sold under a trading system with governments putting a price on carbon dioxide emissions to compel companies to fight climate change. Since 2007, Alberta has run a mandatory carbon offset system for large emitters, and to ensure accuracy, the credits are verified by third-party auditors.

In July 2023, the province of Alberta brought its first criminal proceedings against a carbon credit company under the Emissions Management and Climate Resilience Act, charging 25 charges related to providing misleading information about carbon credits. This is the first time Alberta has taken legal action in the carbon credit sector, reflecting increased scrutiny and enforcement of fraud practices in this market. This is also a lesson for Vietnam about considering cooperation with third-party inventories or when faced with situations of checking the authenticity of registered carbon credit projects.

Based on the above analysis, the carbon credit trading platform in Vietnam should adopt a market approach that is more aligned with global standards. One potential solution worth considering is the regional ETS pilot model implemented by China. The reasons for choosing China as a reference are as follows:

– Both China and Vietnam adopt a phased approach. While China initially launched seven regional ETS pilots to test carbon trading and management models at the local level, Vietnam has also divided its ETS implementation into a pilot phase (2023–2027) and a full operational phase starting in 2028.

– Similar to China, Vietnam focuses first on high-emission sectors such as thermal power and heavy industries (cement, steel production).

– Both China and Vietnam need to balance emission reduction commitments with economic growth. Therefore, both countries began with free carbon allocations to ease the transition for businesses.

Drawing from international experiences generally and China's approach specifically, Vietnam can learn from the following key aspects:

Stage 1: Transaction fees should be waived to encourage early participation and facilitate initial market development. This stage aims to familiarize stakeholders with the carbon market and build foundational trust. The government may also pilot the use of blockchain technologies to manage a limited number of initial transactions before broader deployment.

Stage 2: Plans to link with the ASEAN carbon market should be prioritized to promote regional integration and enhance market liquidity. Once participants are accustomed to the domestic exchange, establishing international connections becomes essential. By leveraging existing relationships with ASEAN countries, Vietnam can strategically link its national exchange to regional counterparts, paving the way for eventual global integration.

By adopting a phased and regionally integrated approach, Vietnam can build a robust, future-ready carbon market that aligns with both national priorities and international climate commitments.

4. CONCLUSION

In summary, establishing a domestic carbon credit trading platform in Vietnam poses a number of inherent challenges for key stakeholders. These challenges come from the costs and administrative burdens participants face in terms of ongoing registration and compliance. Not only directly involved stakeholders but also involved intermediaries may have difficulty in collecting and verifying project documentation in a timely manner, especially when the transaction allows for a change of ownership. In operation, the constant changes and control of quotas lead to proactive demands from the units responsible for emission control to conduct regular emissions inventories, increasing their operational workload. In addition, the current lack of linkages with international exchanges or guidance on transferring credits overseas limits the ability to transfer or recognize credits globally, reducing the attractiveness of the platform.

Lessons from international carbon markets provide valuable insights for Vietnam. India's approach highlights the importance of transparent fee structures, market oversight, and effective trading mechanisms to prevent manipulation and promote fairness. Meanwhile, the European Union's alignment of its ETS with Switzerland demonstrates how international integration can enhance market liquidity and expand trading opportunities. Korea's experience highlights the important role of government technical support and a robust MRV system in reducing compliance burdens, especially for small and medium-sized enterprises. Canada's rigorous auditing procedures and anti-fraud enforcement underscore the need for transparent verification and regulatory oversight to maintain market integrity.

Based on these experiences, combined with a similar approach to China, Vietnam can completely refine its carbon credit trading framework by dividing it into 2 phases with technical support activities for businesses, tax exemptions to attract and anticipate the future by pursuing international market linkages (ASEAN). Such measures will help build a more efficient, transparent and attractive carbon market, facilitating the country's path towards net zero emissions by 2050.

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GENERATIVE ARTIFICIAL INTELLIGENCE: TRANSFORMING MARKETING COMMUNICATIONS IN THE DIGITAL AGE

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ABSTRACT

The rapid advancement of Generative Artificial Intelligence (Generative AI) is profoundly transforming the field of communication, particularly in content creation, information dissemination, and customer interaction. Employing analytical and synthetic methods, this paper discusses the multifaceted impacts of Generative AI on contemporary media practices, the integration of generative technologies into communication activities, and strategic approaches for their implementation within organizations and enterprises. The study aims to provide a comprehensive perspective on the effective and responsible application of Generative AI in the communication landscape.

Keywords: AI, generative AI, generative artificial intelligence, IMC, marketing communications.

1. INTRODUCTION

In the context of the digital era's explosive growth, Artificial Intelligence (AI) has emerged as a transformative force, redefining models of content creation, distribution, and consumption. The integration of AI technologies into the media ecosystem not only automates processes but also unlocks unprecedented possibilities for personalization and analysis (Chan-Olmsted, 2019). Artificial intelligence (AI)-enabled technologies—such as Google Assistant and Amazon Echo—have significantly strengthened the capabilities of leading digital firms, including Google, Spotify, and Amazon. These tools foster deeper consumer engagement, support more accurate market predictions, and optimize automation processes. In parallel, emerging disruptive technologies like the Internet of Things (IoT), blockchain, big data analytics (BDA), and AI are reshaping not only consumer behavior but also societal expectations and the structural operations of businesses (Rita et al., 2025).

Among these advancements, Generative Artificial Intelligence (Generative AI) has emerged as a pivotal innovation reshaping the landscape of marketing communications. As an advanced subset of AI, Generative AI leverages its ability to process and analyze large volumes of data—including textual, visual, and auditory inputs—to generate meaningful insights into consumer behavior and preferences. This capability enables businesses to craft highly personalized and context-specific content, fostering more targeted, effective, and engaging marketing strategies. Unlike traditional mass marketing approaches, Generative AI supports the delivery of individualized messages across various formats—such as text, images, audio, and video—thereby enhancing the relevance and resonance of brand communications. By facilitating deeper customer engagement and enabling data-driven creativity, Generative AI empowers brands to not only streamline their integrated marketing communication (IMC) efforts but also to achieve more precise market positioning and long-term customer loyalty (Büyüksomer & Tekeoğlu, 2024).

Using an analytical approach, this paper seeks to examine the multifaceted impacts of Generative AI on marketing communications. The aim is to provide companies and organizations, particularly those in the communication sector, with insights on how to leverage Generative AI as a tool to enhance communication efficiency, improve customer experiences, strengthen brand value, and achieve competitive advantages.

2. OVERVIEW OF ARTIFICIAL INTELLIGENCE

2.1. Artificial Intelligence and Marketing

"Artificial Intelligence (AI) refers to techniques that enable machines to perform cognitive functions requiring human intelligence, such as learning, reasoning, and interacting with their environment" (Haleem et al., 2022).

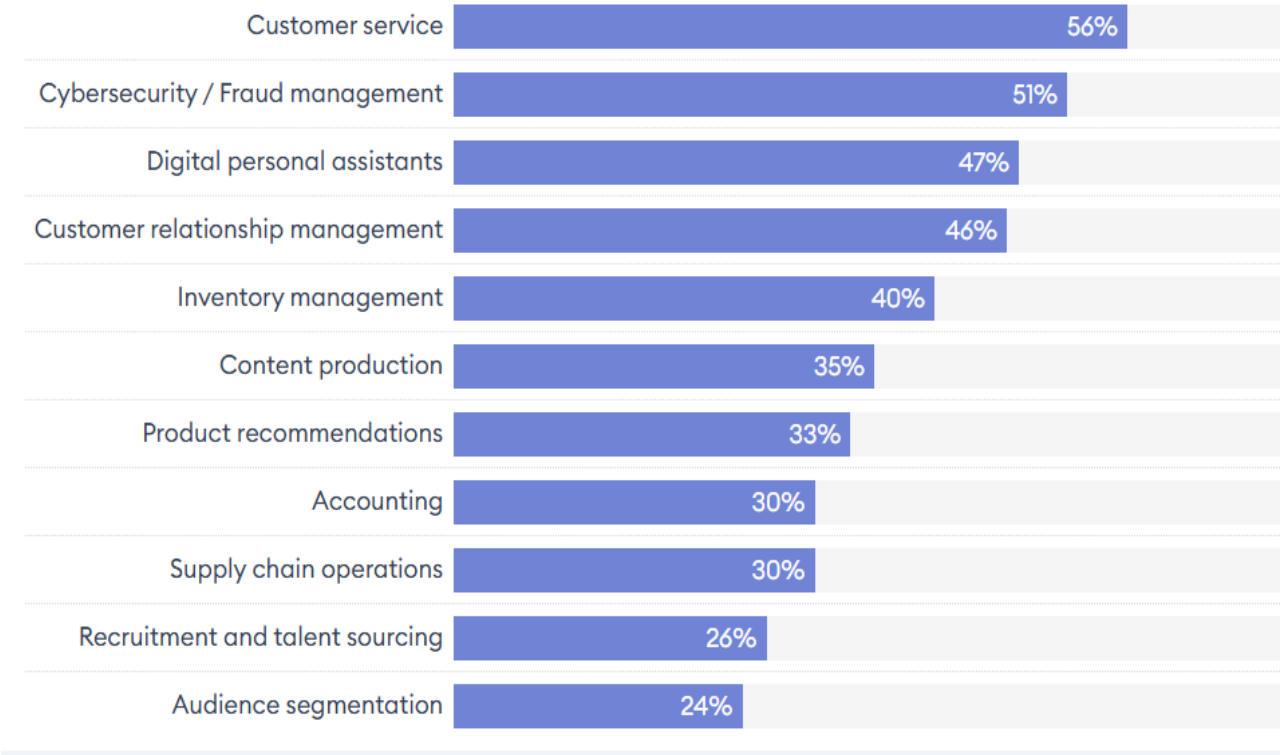


Figure 1: Top ways business owners use Artificial Intelligence

Source: Forbes (2025)

The AI revolution has had a profound impact on marketing and sales. AI's strength lies in delivering personalized services and predictive customer behavior analysis, introducing a new era of marketing efficiency. AI advancements in marketing offer opportunities to improve outdated techniques and enhance customer engagement (Labib, 2024).

A wide range of artificial intelligence (AI) applications are being leveraged to strengthen brand marketing and refine digital strategy implementation. Big data analytics, for instance, empowers brands to gain deeper insights into consumer preferences, enhance user experiences, and anticipate future customer behavior. Techniques such as social network analysis facilitate the examination of user engagement, brand visibility, and customer satisfaction by utilizing platforms like Google Analytics, Facebook Insights, and Twitter Analytics. Additionally, AI-powered tools streamline social media content management, automate scheduling, and improve ad performance. Platforms such as Buffer, Hootsuite, and Social Prout offer user-friendly solutions for content planning and campaign execution, eliminating the need for advanced technical expertise. These tools enable marketers to schedule posts, determine optimal posting times, and efficiently oversee advertising efforts. Moreover, tools like Social Mention provide real-time tracking of social media activity, monitor brand mentions, and extract key themes and trending topics, thereby allowing businesses to better understand audience interactions and fine-tune their communication strategies (Gupta et al., 2024).

Table 1: Advantages and disadvantages of Artificial Intelligence

Advantages	Disadvantages
Improved personalization	High costs
Enhanced advertising campaign management	Requires specialized skills
Better data analytics	Risk of incorrect decisions
Improved customer experience	Reliance on data

Source: Murár and Kubovics, 2023

AI tools provide significant benefits, such as improved personalization, enhanced customer experiences, more effective campaign management, and robust data analytics. However, they also have drawbacks, including high costs, the need for specialized skills, and the risk of incorrect decisions. High costs stem from the complex development of AI, while reliance on data can hinder organizations from fully utilizing AI tools. Despite these challenges, reports suggest that the use of AI tools in marketing will continue to grow in the future (Kuzyk et al., 2023).

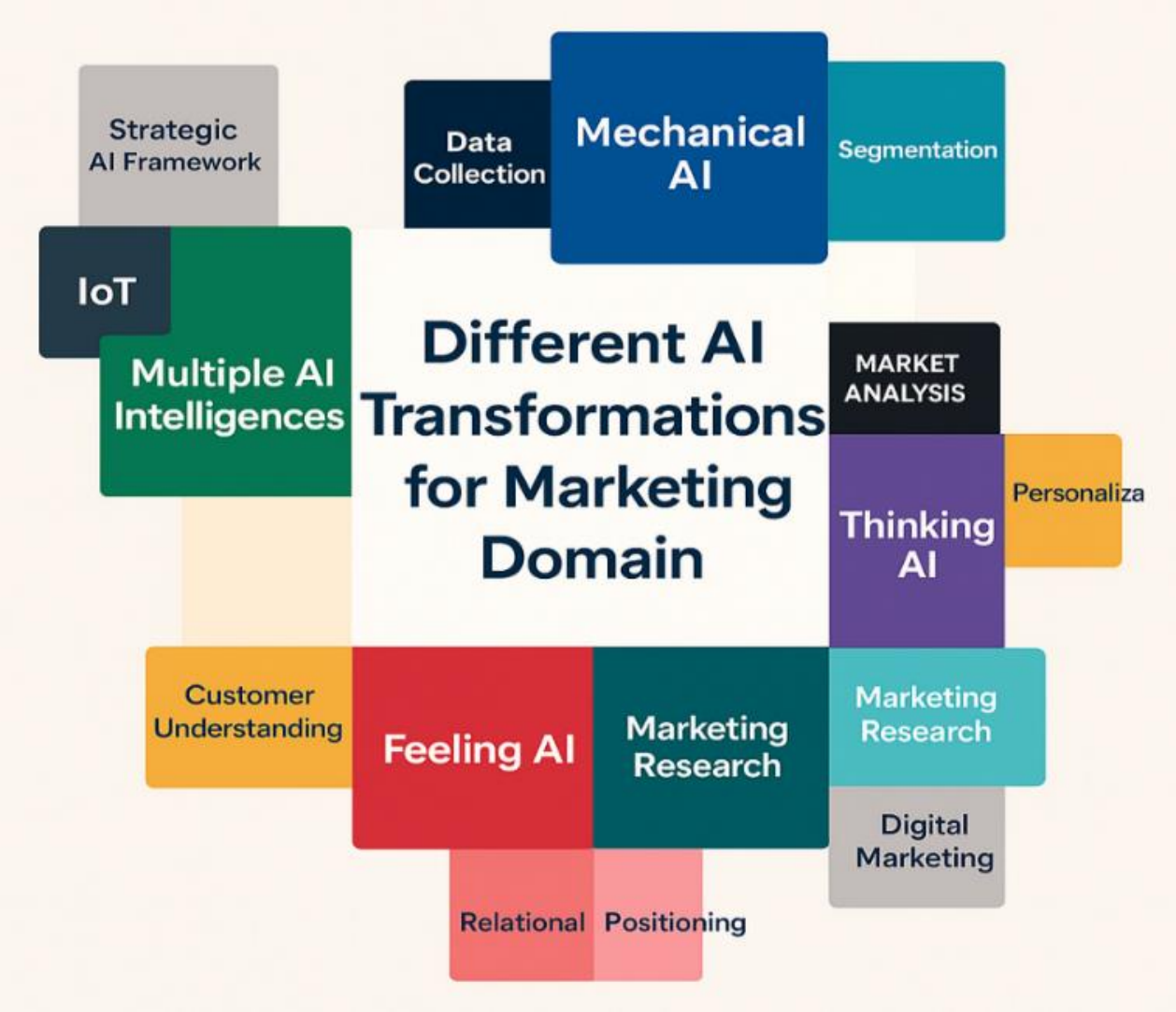


Figure 2: AI Transformation Across Marketing Industries

Source: Haleem et al., 2022.

Table 2. A strategic framework for AI in marketing

AI intelligence Strategic decision	Mechanical AI	Thinking AI	Feeling AI
Marketing action (4Ps/4Cs) Product/ Consumer	***Standardization*** • Consumers may not prefer automated products that are related to their identity (Leung et al. 2018)	***Personalization*** • Topic modeling and ML for service innovation and design (Antons and Breidbach 2018) • Adaptive personalization systems (Chung et al. 2009; Chung et al. 2016; Dzyabura and Hauser 2019; Liebman et al. 2019) • Deep learning for personalized point-of-interest recommendation (Guo et al. 2018) • Video-based automated recommender	Relationalization • Train conversational AI to have brand personality (Wilson and Daugherty. 2018) • AI personalizes engagement marketing (Kumar et al. 2019) • Service interactions can be personalized by "substituting information for interaction" (Glushko and Nomorosa 2013) • AI intelligences can be used to engage customers in the service journey (Huang and Rust 2020) • Track brand reputation through sentiment analyses social media content (Rust et al. 2020) • Customers perceive AI chatbots to be to be less empathetic (Luo et al. 2019)
Price/ Cost	• Consumers' online WOM can be used to automate price changes based on ML tools (Feng et al. 2019)	• Multiarmed bandit algorithms from statistical machine learning dynamically adjusted online prices with incomplete price information (Misra et al. 2019) • Machine learning based on Bayesian inference optimize online pricing with sparse and noisy data (Bauer and Jannach 2018) • Consumers' private information for price personalization (Montes et al. 2019)	• Interpersonal likeability would impact the price negotiation outcome in a B2B relationship (Pulles and Hartman 2017)
Place/ Convenience	• Mechanical AI automates service process (Huang and Rust 2018) • IoT optimizes retail processes (Grewal et al. 2018) • Service robots interact with scale and consistency (Wirtz et al. 2018) • Service robots automate social presence in frontline (Mende et al. 2019; van Doorn et al. 2017)	• Video-based garment recommender (Lu et al. 2016) • Service robots deliver customized experience (Wirtz et al. 2018)	• Service robots surface acting (Wirtz et al. 2018) • Consumers resistance to medical AI (Longoni et al. 2019) • One-voice strategy for customer engagement across diverse interfaces enabled by machine-age technologies in a customer journey (Singh et al. 2020)
Promotion/ Communication	• Automate classification of social media content and sentiment (Hartmann et al. 2019) • AI automates media buying process (Chen et al. 2019)	• Intelligent purchasing, dynamic pricing, targeting, and retargeting (Kietzmann et al. 2018) • Content engineering by ML and NLP (Lee et al. 2018) • Combine ML and NLP to detect copycat apps (Wang et al. 2018) • AI transforms advertising creative processes (i.e., programmatic creative) (Chen et al. 2019) • Personalized mobile marketing strategies center on 4Ps (Tong et al.	• NLP analyzes social media ad content enhances consumer engagement (Lee et al. 2018) • AI chatbots for outbound sales calls (Luo et al. 2019) • NLP algorithms analyze Facebook messages to examine the association between social media content and user engagement (Lee et al. 2018) • Personalized ad backfires if privacy concern is heightened (Kim, Barasz, and John 2019)

Source: Huang & Rust, 2021

2.2. Artificial Intelligence and Communication

According to the American Marketing Association (AMA), "Marketing communication refers to coordinated advertising messages and related media used to communicate with the market. Marketing communication messages are delivered through one or more channels such as digital media, print, radio, television, direct mail, and personal selling" (AMA, 2024).

In today's dynamic global marketplace—marked by fluctuating consumer behavior, rising expectations, and

escalating competition—artificial intelligence (AI) has become a foundational component in advancing marketing communication. AI-generated data serves as a valuable resource for cultivating stronger customer relationships and crafting strategies centered on consumer needs. By analyzing real-time interactions alongside historical engagement data, AI facilitates the rapid creation of comprehensive consumer profiles, thereby enabling more targeted and effective communication efforts. Furthermore, AI revolutionizes marketing by customizing campaign strategies and advertising content to align with individual customer preferences. It also equips brands with a strategic advantage, allowing them to refine their communication plans based on consumer responses and brand engagement patterns. Ultimately, enhancing communication through AI is a key priority for businesses, as it strengthens customer interaction and sustains competitive positioning in a rapidly evolving digital landscape (Alkaddour, 2022; Haleem et al., 2022).

Organizations can leverage simulation models powered by artificial intelligence (AI) to deliver products and services through virtual assistants. AI has the potential to substitute human involvement in strategic marketing processes by offering in-depth data analysis and actionable insights. Through advanced data processing, AI can anticipate consumer preferences and decision-making patterns, thereby improving user experiences and ensuring that targeted audiences receive offerings that align closely with their actual needs and expectations (Haleem et al., 2022).

In recent years, marketers have primarily used AI to analyze data and create predictive models. These techniques have helped marketers better understand consumer behavior, segment audiences, and personalize marketing campaigns. AI-powered algorithms can analyze vast amounts of data, identifying patterns and trends that are challenging for humans to detect.

AI holds great potential for collecting, analyzing, and processing data, enabling companies to adapt and meet the high demands of their customers. AI-integrated systems in search tools allow for quick and easy access to large volumes of user data by establishing personalized communication with consumers. This means delivering the right message to the right person at the right time on the right platform.

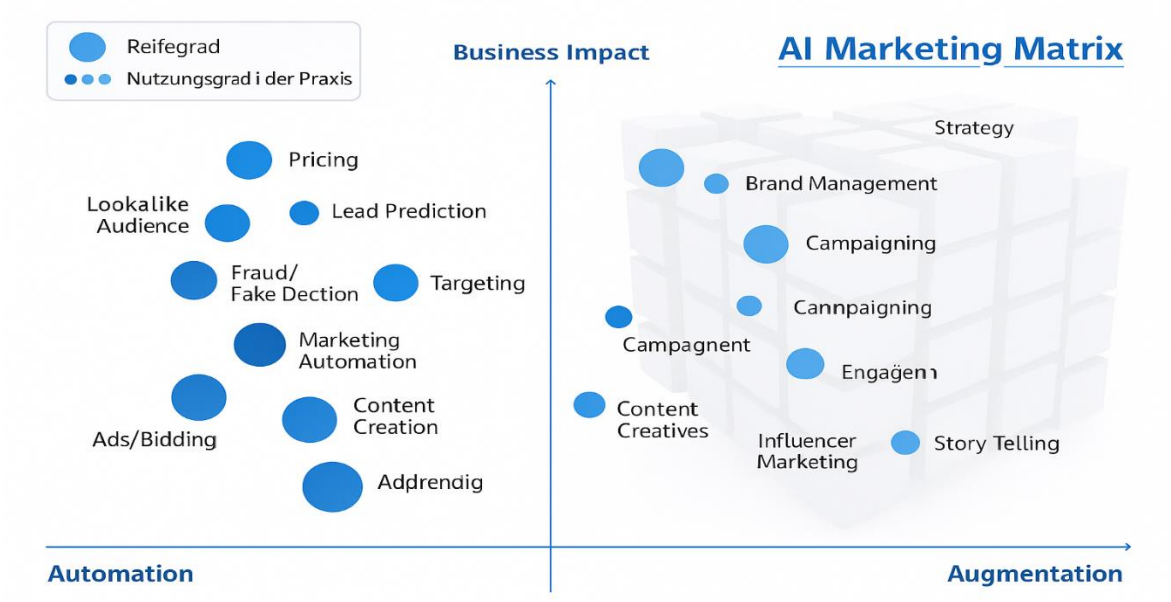


Figure 3: AI Marketing and Intelligent Communication

Source: Đurić, Ilić, & Jovanović, 2023

3. GENERATIVE ARTIFICIAL INTELLIGENCE (GENAI) AND MARKETING COMMUNICATIONS

3.1. Generative Artificial Intelligence (GenAI)

Artificial Intelligence (AI) has significantly evolved over the years, and one of its most notable advancements is the development of Generative Artificial Intelligence (GenAI). While traditional AI applications rely on algorithms that simulate human intelligence to perform tasks requiring cognitive capabilities, GenAI goes beyond these functionalities (Kumar et al., 2025).

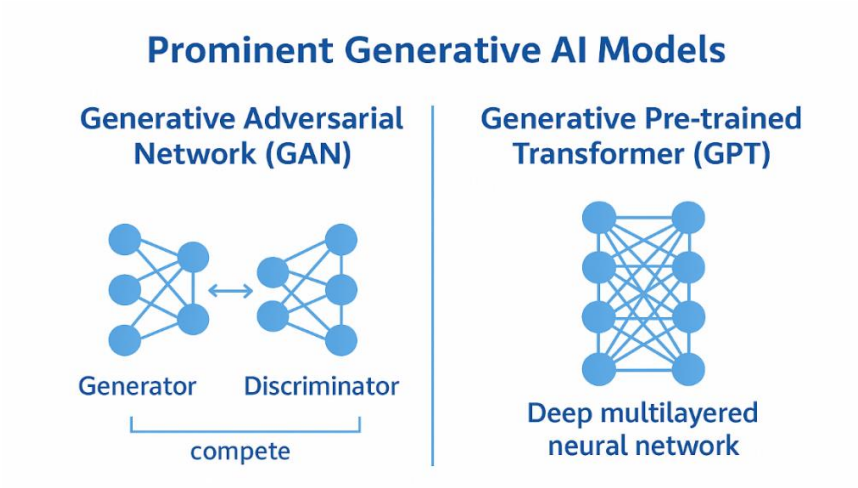


Figure 4: Two Prominent Generative AI Models

Source: Gupta et al., 2024

Generative AI focuses on training generative models on existing datasets and using these models to create new data that resembles the original. Generative AI leverages generative models and advances in deep learning (DL) to produce a wide variety of data, including images, text, audio, and video. These generative models can create new creative content, improve analytical accuracy, and even simulate realistic virtual experiences (Gupta et al., 2024).

Table 3. Main GenAI Tools Used in Integrated Marketing Communication (IMC)

IMC Functions	AI Tools
Content Generation	Jasper.ai, Headline; Aleph Alpha; OpenAI Codex; DALL·E 2
Ad Creator	Pencil
Content Optimization	Frase.io
SEO (Search Engine Optimization)	Alli AI; SEMrush; Frase; SurferSEO
Communication & Sales	Conversica; People.ai; Dooly; Chatfuel; Fathom; Acquire
Email Marketing	Automizy; Mails.ai; Optimove; EmailOctopus; Drift; SeventhSense; LeadGnome
Social Media Marketing	Cortex; WriteSonic ; HubSpot; Brandwatch; Lately
Website Optimization	Optimizely; VWO – Visual Website Optimizer; DataRobot.
Business & Market Strategy	RapidMiner; Crawl.ai; Momentive; Kompyte; Craiyon
Brand Design	Fontjoy; Namelix; StockIMG.AI; Midjourney; Canva AI
Customer Service	Freshworks; Salesforce; LiveChat; Helpshift; Groove; Kayako

Source: Yoldaş & Aycı, 2024

Generative AI empowers organizations to craft highly personalized content, streamline communication strategies, and develop innovative approaches to customer engagement. This emerging technology represents a transformative shift in how businesses interact with their audiences and build competitive advantages in an increasingly digital-driven world.

Generative AI provides a novel and groundbreaking perspective in marketing communications, driving businesses to transform their traditional marketing communication methods**.** By harnessing the power of generative AI, businesses can engage with their target audience in more meaningful and impactful ways. Generative AI enables brands to continue the conversation with their savvy and perceptive customers by delivering customized, high-impact, human-like content that consumers can easily relate to on a personal level. By enabling the dissemination of customized messages aligned with individual consumer preferences, artificial intelligence contributes to increased customer satisfaction and fosters long-term brand loyalty.

Generative AI offers significant potential for streamlining routine tasks and facilitating data-informed marketing decision-making. These technologies empower businesses to improve operational productivity and craft marketing strategies grounded in analytics. Furthermore, generative AI supports integrated marketing communications by refining existing content and enhancing channels for customer engagement. AI-based tools are also capable of generating original and creative ideas, conducting performance assessments, and fostering consumer relationships. Collectively, these capabilities assist organizations in shaping their brand identity, achieving effective market positioning, and expanding their customer base through a combination of analytical, strategic, and creative functions (Büyüksomer & Tekeoğlu, 2024).

3.2. Integration of Generative AI into Marketing Communications

"In the dynamic interaction between generative artificial intelligence (Gen AI) and marketing communications, Gen AI serves as a catalyst for innovation and efficiency in how modern consumers are reached, understood, and engaged. This integration is not merely a technological upgrade; it represents a fundamental transformation in the way businesses connect with their audiences, fostering deeper and more personalized relationships. As we navigate this intersection of technology and communication, understanding the multifaceted impact of Gen AI on marketing communication becomes crucial for companies aiming not only to survive but also to thrive in the digital era (Senyapar, 2024). Gen AI systems help companies foster stronger relationships and deeper engagement with their target audiences by gaining deeper insights into customer needs and preferences, thereby creating a virtuous cycle of improved customer understanding and enhanced service delivery (Büyüksomer & Tekeoğlu, 2024).

*Firstly, Customer Behavior Analysis and Experience Enhancement***,** Generative AI (Gen AI) has transformed how businesses understand and engage with customers, particularly within marketing communications. By leveraging advanced analytics, Gen AI allows companies to gain deeper insights into customer behaviors and preferences, enabling unprecedented levels of personalization and engagement. This shift redefines brand-audience interactions, making them more targeted, meaningful, and effective. Furthermore, Gen AI facilitates real-time responsiveness through chatbots and virtual assistants powered by natural language processing, offering 24/7 support, personalized recommendations, and transaction facilitation. These AI-driven tools simulate human-like conversations, enriching customer experience. Sentiment analysis further enhances this by interpreting customer perceptions from social media, reviews, and feedback, enabling brands to adapt communication strategies based on public sentiment (Senyapar, 2024).

Secondly, Personalized Marketing and Targeted Advertising, In the ever-evolving landscape of marketing communications, Gen AI is foundational in enabling personalized and targeted advertising strategies. By analyzing vast datasets—including past purchases, search history, and social media behavior—Gen AI extracts rich consumer insights to create tailored marketing messages that resonate on an individual level. This results in marketing communications that are far more relevant and effective compared to traditional generic broadcasts.

Thirdly, Content Creation and Management, Gen AI reshapes content production and management by providing creative tools that boost efficiency and content performance. Natural language generation technologies produce coherent, engaging written content aligned with brand voice—from product descriptions to blog posts. Additionally, AI supports the creation of visual content such as images and videos by analyzing trends and suggesting design elements like layouts and color schemes tailored to audience preferences. This allows marketers to maintain a consistent and dynamic content flow in today's fast-paced digital environment.

Fourthly, Chatbots and Customer Service, AI-powered chatbots have revolutionized customer service within marketing communications. These virtual assistants enable businesses to offer real-time, personalized support across multiple digital channels, meeting modern consumers' expectations for instant responses. Leveraging natural language processing and machine learning, chatbots can answer queries, facilitate transactions, and provide context-aware responses based on customer data, greatly enhancing engagement and satisfaction.

*Fifthly, Marketing Automation***,** Gen AI enhances marketing efficiency by automating diverse tasks such as campaign management, content generation, customer service, and data analytics. These capabilities allow continuous optimization of marketing efforts through evolving algorithms and A/B testing, enabling personalized marketing at scale and expanding beyond traditional automation limits.

*Sixthly, Social Media and Influencer Marketing***,** The integration of Gen AI with social media and influencer marketing reshapes engagement strategies by automating processes, personalizing content, and providing data-driven insights. This synergy improves campaign effectiveness and enables brands to leverage influencer partnerships with greater precision.

Seventhly, Lead Generation, Gen AI streamlines lead generation by engaging prospects through chatbots, delivering relevant content, and gathering detailed lead data via interactive surveys or forms. By decoding consumer intent with natural language processing, Gen AI identifies when customers seek specific products or services and offers targeted recommendations. Additionally, it analyzes behavior to optimize lead generation channels and messaging, thereby maximizing marketing ROI.

Eighthly, Predictive Analytics, Gen AI significantly advances marketing communication through predictive analytics. By analyzing historical data and forecasting future consumer behaviors and market trends, it enables marketers to make proactive, data-driven decisions. This forward-looking approach facilitates strategic planning and enhances the effectiveness of marketing campaigns.

4. CHALLENGES AND STRATEGIES FOR ORGANIZATIONS

In the first place, the training and maintenance of Generative AI (Gen AI) systems with accurate and comprehensive datasets are paramount to avoid the generation of erroneous outputs that could adversely affect consumer perceptions. Successful implementation of Gen AI technologies demands significant investments in human capital, technological infrastructure, and financial resources. These requirements pose particular challenges for small and medium-sized enterprises (SMEs), which may lack the necessary capacity. As AI systems grow in complexity, they require expert knowledge and specialized staff training (Đurić et al., 2023). Consequently, organizations must recruit skilled data scientists, AI specialists, and technical personnel, while also investing in appropriate hardware and software.

Next, safeguarding data privacy and security is critical, both to comply with regulatory frameworks and to maintain customer trust. The use of Gen AI in marketing analytics introduces significant challenges regarding the protection of sensitive personal data. The absence of clear ethical standards, privacy policies, operational guidelines, and legal regulations can have serious ramifications for both businesses and consumers. To mitigate these risks, organizations need to establish robust data governance frameworks, implement advanced security protocols, and adopt transparent data handling practices. This includes conducting regular security audits, encrypting sensitive information, and clearly communicating data usage policies to customers.

In addition, responsible development and oversight of AI systems are essential to ensure compliance with ethical standards and promote fairness. The ethical dimensions of employing Gen AI in marketing and communications represent a critical concern. It is imperative that Gen AI systems operate with objectivity and adhere to ethical principles to prevent bias and unlawful practices. Organizations should institute rigorous testing protocols to detect and address potential biases, regularly monitor AI outputs, ensure diversity in training datasets, and develop explicit ethical guidelines governing AI deployment.

Finally, organizations must cultivate adaptability to keep pace with the rapid evolution of AI technologies. Marketing teams need a clear understanding of AI capabilities and limitations to effectively integrate these tools into their operational workflows. Additionally, businesses must align their AI-driven marketing strategies with broader organizational goals, necessitating continuous training initiatives, regular updates to technological infrastructure, and the establishment of flexible organizational processes that accommodate ongoing technological advances (Büyüksomer & Tekeoğlu, 2024).

5. CONCLUSION

In conclusion, generative AI is opening a unique frontier in marketing communications. These tools empower marketers by expanding the range of available solutions, enabling the creation of personalized customer experiences and fostering deeper audience understanding. When integrated into communication strategies, Gen AI allows marketers to automate tasks, enhance customer engagement, and better understand consumer behavior—ultimately simplifying workflows and improving communication strategies. However, to harness the full potential of Gen AI in marketing communications, businesses must closely monitor technological developments, improve data quality, invest in Gen AI applications, and enhance their understanding of its implementation and infrastructure. Furthermore, safeguarding privacy

and consumer rights by addressing ethical and security concerns is essential.

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EXPEDITING PROGRESS TOWARDS THE 2030 DEADLINE: RECOGNISING VIETNAM'S E-GOVERNANCE 'RED ZONES' AND THE RISKS THEY PRESENT TO NATIONAL SDG PREPAREDNESS

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ABSTRACT

This study examines the correlation between the quality of provincial e-governance and the preparedness for Sustainable Development Goals (SDG) throughout Vietnam. The research employs cross-sectional econometric analysis utilising secondary data from the 2024 PAPI e-governance index, VASS-UNDP SDG scores, and provincial GDP per capita to assess the effects of digital governance and economic capability on SDG performance. Findings indicate that economic capability is a robust predictor of SDG preparation, whereas the influence of e-governance, though favourable, remains statistically ambiguous. The results underscore significant geographical inequalities, pinpointing "red zones" that necessitate focused digital transformation efforts. This work enhances the policy discourse by advocating for prioritised actions and urging additional research that incorporates spatial econometric models to elucidate interprovincial spillover effects and enhance national SDG advancement by 2030.

Keywords: E-Governance, Sustainable Development Goals (SDGs), Vietnam Spatial Econometrics, Public Sector Digital Transformation

1. INTRODUCTION

Vietnam has made considerable progress in sustainable development, pledging to fulfil the United Nations' Sustainable Development Goals (SDGs) by 2030. Nonetheless, considerable disparities remain among provinces, especially regarding the implementation and efficacy of digital governance or e-governance initiatives. Effective governance, especially via digital platforms, is acknowledged as a vital facilitator for attaining comprehensive developmental goals (Nguyen et al., 2024; OECD, 2023). In this context, comprehending how regional disparities in citizen-assessed e-governance capabilities can influence SDG preparedness is crucial for fostering equitable and inclusive development throughout Vietnam.

Prior studies emphasise that strong e-governance systems augment administrative transparency, bolster public trust, and promote equitable access to public services, thereby substantially furthering Sustainable Development Goals, particularly the establishment of effective, accountable institutions (SDG 16) and the enhancement of partnerships for goals (SDG 17) (Deb, 2020; Wescott, 2005). In contrast, provinces with diminished digital government capabilities designated as 'red zones' present potential threats to Vietnam's comprehensive achievement of the Sustainable Development Goals by generating bottlenecks that may impede national advancement (Nguyen Minh Tri, 2025).

This study seeks to empirically investigate the degree to which provincial e-governance scores, as recorded in the 2023 Public Administration Performance Index (PAPI), affect provincial-level Sustainable Development Goal (SDG) achievement scores as evaluated by the VASS-UNDP Provincial SDG Index (2022). The study utilises cross-sectional econometric analysis to combine e-governance performance indicators with socioeconomic controls, particularly provincial GDP per capita, in order to pinpoint provinces that necessitate immediate policy interventions.

This research identifies provinces designated as e-governance 'red zones', offering policymakers actionable insights for prioritising investments in digital infrastructure and governance reforms. Addressing these disparities is essential for achieving the 2030 SDG deadline and for maintaining Vietnam's long-term socio-economic growth and resilience in a progressively digital landscape.

2. Literature Review:

2.1. Analysing the Correlation between E-Governance and Sustainable Development Goals in Vietnam

The body of literature about e-governance and sustainable development has proliferated in recent years, indicating an increasing focus from both policymakers and scholars on the United Nations' Sustainable Development Goals (SDGs) and their convergence with digital governance changes. This literature highlights distinct trends, a growing agreement, and contentious areas about the potential and obstacles of utilising e-governance to expedite advancements towards Sustainable Development Goals at the province level in Vietnam.

E-governance encompasses the utilisation of information and communication technology (ICT) by governmental bodies to improve the accessibility, efficiency, and transparency of public administration (West, 2004; Wescott, 2005). In Vietnam, the e-governance initiative has progressed alongside the government's dedication to the Sustainable Development Goals, especially following the endorsement of the 2030 Agenda for Sustainable Development. Numerous recent research and policy documents delineate the trends in e-governance adoption and their anticipated effects on SDG-related outcomes among provinces (Nguyen et al., 2024; VASS, 2023).

Provincial inequities are a persistent issue. Mapping investigations (e.g., VASS, 2023; PAPI, 2024) Document significant disparities in e-governance ratings and SDG preparedness among the 63 provinces of Vietnam. Top-performing provinces exhibit elevated citizen satisfaction with digital public services and substantial progress in the Sustainable Development Goals (notably SDG 16: Peace, Justice, and Strong Institutions, and SDG 17: Partnerships for the Goals), whereas lower-performing provinces, commonly designated as "red zones," fall markedly short. These areas demonstrate inadequate digital governance and suboptimal SDG results, indicating a discernible geographic and administrative pattern.

Numerous empirical mapping studies have proven e-governance as a catalyst for Sustainable Development Goal (SDG) performance. The UNDP's PAPI 2024 dataset and VASS's Provincial SDG Dashboard indicate a favourable correlation between provincial e-governance (pillar 8 in PAPI) and composite SDG ratings. This study's regression model corresponds with OECD (2023) findings, emphasising that effective, digitally enabled governance is essential for sustained economic growth and a green transition in Vietnam. Research published in the Journal of Open Innovation (Nguyen et al., 2024) underscores that perceived usefulness and ease of use fundamental elements of the Technology Acceptance Model (TAM) are pivotal in the uptake and success of e-government services.

Quantitative mapping underscores the significance of socioeconomic factors, particularly GDP per capita, as both a predictor and a moderator of SDG attainment. Affluent provinces frequently serve as early adopters of e-government platforms, hence exacerbating regional disparities (OECD, 2023; VASS, 2023).

2.2. E-Governance, Institutional Integrity, and the Sustainable Development Goals

The literature regularly associates e-governance with comprehensive institutional quality metrics, extending beyond mere mapping. Research conducted by Ha et al. (2024) in Heliyon and the OECD (2023) highlights that e-governance efforts facilitate the implementation of SDGs by improving administrative transparency, accountability, and public trust essential elements for institutional efficacy (SDG 16). Regional mapping evaluations (Wescott, 2005; IWEP, 2023) corroborate these trends, indicating that the proliferation of digital services can enhance certain Sustainable Development Goals (SDGs), particularly those pertaining to social inclusion (SDG 10), quality education (SDG 4), and sustainable cities (SDG 11).

Nonetheless, mapping studies reveal enduring problems. The research indicates a pronounced urban-rural disparity, with metropolitan regions such as Hanoi and Ho Chi Minh City routinely surpassing distant and hilly provinces. This spatial pattern, seen in both e-governance and SDG indicators, has remained consistent over several years (VASS, 2023; PAPI, 2024). The implementation of digital services is frequently obstructed by infrastructural and human capacity limitations at the local government level, as emphasised by Nguyen et al. (2024) and the case study of Binh Dinh (2025).

2.3. Cataloguing Methodological Approaches in the Discipline

Analytical evaluations of methodology indicate a distinct inclination towards cross-sectional, province-level quantitative research, frequently utilising regression-based techniques to examine the correlation between governance

indicators and SDG outcomes (Nguyen et al., 2024; IWEP, 2023). The current analysis used OLS regression with robust errors to assess the marginal impact of e-governance scores on SDG readiness, while controlling for log-transformed GDP per capita, a methodological strategy that is directly reflected in the existing literature.

The utilisation of secondary, government-provided data (PAPI, VASS SDG Dashboard, GSO) is prevalent, enhancing the dependability and reproducibility of mapping analysis. Recent research have employed spatial econometric models to evaluate spillover effects among adjacent provinces, although these methodologies are infrequently utilised due to data and technical constraints.

2.4. Policy Developments and Consequences

The literature delineates a policy transition towards incorporating digital transformation as a fundamental mechanism for attaining the SDGs, consistent with governmental plans outlined in official directives (MIC,2023). Policy mapping indicates that, although significant advancements have occurred, the rate of reform and implementation differs markedly, with certain provinces still failing to harness the complete potential of digital governance to expedite sustainable development.

International mapping evaluations (e.g., OECD, 2023; Wescott, 2005) indicate that Vietnam's strategy reflects global trends, although is hindered by capacity limitations, inconsistent infrastructure, and regional inequalities. These studies advocate for focused investments in digital competencies, administrative streamlining, and transparent ESG (Environmental, Social, and Governance) reporting to further advance the attainment of SDGs, reflecting findings from the Vietnamese context (Ha et al., 2024).

2.5. Identifying Gaps and Outlining Directions for Future Research

A comprehensive analysis of the literature reveals several significant gaps. Although correlations between e-governance and Sustainable Development Goal (SDG) progress are frequently documented, causal links are little investigated due to the prevalence of cross-sectional methods. Secondly, there exists a paucity of mapping about negative cases or "red zones" beyond mere identification; qualitative and mixed-method studies are requisite to clarify boundaries and context-specific challenges. Third, limited research systematically assesses the enduring impacts of digital changes or the sustainability of the apparent improvements in SDG performance.

2.6. Synthesis and Contribution to the Current Study

The literature together indicates a strong, positive correlation between provincial e-governance and SDG readiness, hence justifying the current empirical investigation. This evaluation substantiates its emphasis on pinpointing provincial "red zones" where digital transformation is deficient, and on measuring the incremental effect of e-governance enhancements for the acceleration of Sustainable Development Goals (SDGs). This research contextualises itself within established patterns, methodology, and literature gaps, so consolidating current knowledge and addressing specific demands for data-driven, province-level policy guidance.

3. THEORETICAL FRAMEWORK AND HYPOTHESES.

3.1 Theoretical Framework

This study examines the factors influencing Sustainable Development Goal (SDG) readiness in Vietnamese provinces, focussing on the assertion that the quality of institutions and governance especially as demonstrated by digital (e-governance) transformation is a key driver of development outcomes at the subnational level. The primary focus of this analysis is the significant disparity in SDG performance among provinces, despite consistent national objectives and directives. This research employs an institutional and policy-oriented analytical framework, emphasising the quality of provincial government as the primary explanatory variable, rather than individual behaviour or isolated initiatives.

Framework Selection: Governance, Digital Transformation, and Policy Diffusion

This framework integrates multiple theoretical perspectives and previous empirical evidence.

- **Governance Theory:** According to the OECD (2023) and Deb (2020), effective, accountable, and transparent institutions are both an objective (SDG 16) and a vital facilitator for the attainment of all other SDGs. Effective institutions are defined by their ability to devise, execute, and oversee policies that are responsive, equitable, and inclusive.

– **Digital Governance and E-Governance:** According to Wescott (2005) and Nguyen et al. (2024), e-governance is defined as the use of information and communication technology (ICT) to enhance transparency, efficiency, citizen engagement, and accountability. In Vietnam, the quality of e-governance is systematically assessed through the e-governance pillar of the PAPI index, serving as a practical tool for institutional transformation.

– **The Technology Acceptance Model (TAM)** is typically utilised to elucidate individual technology adoption; however, this study modifies its constructs (perceived usefulness, ease of use) for an institutional context positioning e-governance systems as innovations whose effects are influenced by the capacity and readiness of provincial governments to implement and integrate them into public administration.

– **Policy Diffusion and Spatial Spillover:** Recent regional development research (OECD, 2023) emphasises that institutional innovations, such as e-governance, extend beyond individual provinces and can demonstrate spatial spillover effects. Successful policy innovations in one province may disseminate through demonstration, emulation, or cross-border collaboration to adjacent provinces, resulting in clusters of elevated or diminished SDG performance.

Presumptions and Analytical Reasoning

This framework contains several explicit assumptions.

– Provincial governments serve as the principal unit of analysis and intervention for the acceleration of Sustainable Development Goals (SDGs).

– E-governance is a variable factor influencing SDG preparedness and serves as a pertinent indicator of institutional quality.

– Economic resources, represented by log GDP per capita, are essential controls; at present, they do not completely mediate the relationship between governance and the Sustainable Development Goals (SDGs).

– The impacts of governance could exceed administrative boundaries through spatial spillover.

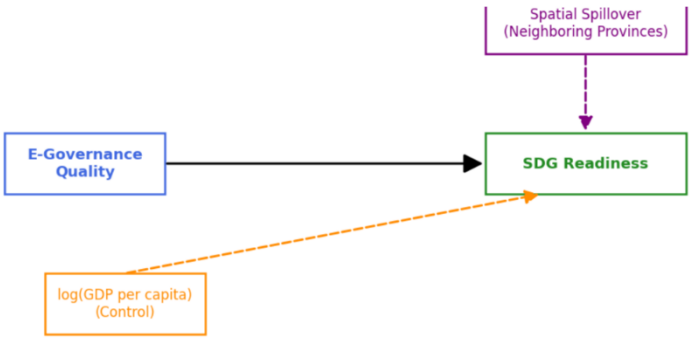
Framework in Research Methodology

This theoretical framework directly influences the:

– Research Question: In what manner does e-governance influence the preparation for Sustainable Development Goals (SDGs) at the provincial level? Does this association endure when considering the economic context? Do spatial interdependencies exist?

– Variable Selection: The e-governance score (PAPI), SDG preparedness (VASS–UNDP), and logarithm of GDP per capita (GSO) are systematically compiled at the provincial level.

– Methodology: Ordinary Least Squares (OLS) regression with robust standard errors to estimate direct impacts; spatial lag models to assess spillover effects.



Visual Schematic of the Analytical Framework
• Solid arrow: Main hypothesized effect
• Dashed arrow: Control and spatial spillover effects

3.2. Hypotheses

Based on this framework, the following hypotheses are formulated:

H1: Provinces with elevated citizen-rated e-governance ratings will demonstrate markedly superior SDG ready scores.

H2: The favourable correlation between e-governance and SDG preparedness will remain significant when accounting for provincial economic capacity (log GDP per capita).

H3 (Exploratory): Spatial spillover effects exist, whereby enhancements in e-governance and SDG achievement in one province correlate with advancements in other provinces.

3.3. Spatial Effects and Model Extension

The main assumptions concentrate on intra-provincial effects, however increasing evidence in policy diffusion and regional economics indicates that public sector reforms, particularly in digital governance, may "spill over" to adjacent jurisdictions. This is particularly feasible in Vietnam due to:

- Regular regional development initiatives and interprovincial cooperation.
- Migration, commercial connections, and reciprocal media exposure.
- Demonstration impacts wherein prominent provinces establish benchmarks for others.

Spatial Lag Model Specification

The spatial lag model expresses this as:

$$SDG_i = \rho \sum_{j \neq i} W_{ij} SDG_j + \beta . Egov_i + \gamma . \log(GDPpc_i) + \varepsilon_i$$

Where:

SDG_i= SDG score of province iii

W_{ij} = spatial contiguity (e.g., shared borders)

ρ\rhoρ = strength of spatial spillover

$Egov_i$ = e-governance score of province i

log($GDPpc_i$) = economic control

ε_i = error term

A positive and substantial ρ implies that enhancements in one province's SDG readiness correlate with advancements in neighbouring provinces.

Incorporating geographical effects enhances methodological rigour and reveals policy potential for regional coordination by identifying "clusters" or "red zones" where interventions can yield a wider impact.

Model	Equation	Interpretation
OLS	$SDG_i = \alpha + \beta Egov_i + \gamma \log(GDPpc_i) + \varepsilon$	Direct, within-province effects
Spatial Lag	$SDG_i = \rho W SDG_j + \beta Egov_i + \gamma \log(GDPpc_i) + \varepsilon$	Direct + neighboring spillovers

4. RESULT AND DISCUSSION

4.1. Results

Descriptive Statistics and Model Overview

The research utilised a cross-sectional Ordinary Least Squares (OLS) regression model with robust standard errors (HC3) to assess the correlation between province e-governance performance and Sustainable Development Goal (SDG) readiness in Vietnam. The dependent variable, sdg_score, indicates composite provincial-level SDG readiness (range: 0–100) derived from the VASS-UNDP Index. The independent variables comprise egov_score from the PAPI 2024 dataset (indicating citizen-evaluated e-governance quality, scale: 1–10) and the logarithm of province GDP per capita (log_GDP_pc) obtained from the General Statistics Office (GSO), functioning as an economic control.

The regression model demonstrated overall statistical significance, evidenced by an F-statistic of 10.86 and a p-value

of 9.46e-05, signifying that the independent variables collectively account for a substantial percentage of the variance in SDG readiness among provinces. The model produced an R-squared of 0.446 and an adjusted R-squared of 0.427, indicating that roughly 43–45% of the variance in SDG performance is explained by the predictors included.

Table 1. OLS Regression Summary

Independent Variable	Coefficient (Coef.)	Std. Error	z-value (or t)	P-value	95% Confidence Interval
const	-0.5013	11.329	-0.044	0.965	[-22.705, 21.703]
egov_score	0.6451	2.026	0.318	0.750	[-3.326, 4.616]
log_GDP_pc	26.7085	6.618	4.036	0.000	[13.737, 39.680]

- Dependent variable: sdg_score
- R-squared: 0.446
- Adj. R-squared: 0.427
- No. observations: 63
- Key coefficients:
  egov_score: $\beta = 0.6451$, SE = 2.026, $p = 0.750$
  log_GDP_pc: $\beta = 26.7085$, SE = 6.618, $p < 0.001$

Source: by author's calculations

This model accounts for almost 45% of the variance in provincial SDG scores, demonstrating moderate explanatory capacity in elucidating cross-provincial disparities in SDG preparation influenced by digital governance and economic development.

4.2. Coefficient Interpretation

Economic Capacity: A Strong Predictor

The coefficient for log_GDP_pc was 26.7085 ($p < 0.001$), signifying a robust, positive, and statistically significant correlation between economic progress and SDG readiness. A one-unit rise in the logarithm of GDP per capita correlates with an average increase of 26.7085 points in the SDG score, assuming e-governance remains constant. This discovery corresponds with economic development theory and existing empirical literature, highlighting that affluent provinces typically have superior infrastructure, governance capabilities, and resources for executing SDG-aligned policies (OECD, 2023; Ha et al., 2024).

E-Governance: Directionally Positive but Statistically Inconclusive

The coefficient for egov_score was 0.6451, indicating a moderate positive correlation between the quality of e-governance and preparation for the Sustainable Development Goals (SDGs). The effect was not statistically significant at the 0.05 threshold ($p = 0.750$). The confidence interval for this estimate spanned from -3.33 to 4.61, signifying considerable uncertainty on the effect size.

The absence of statistical significance should not be construed as conclusive evidence negating the influence of e-governance. It indicates that, given the limitations of the existing model and dataset, the independent impact of e-governance is either minimal, contextually dependent, or masked by measurement error or omitted factors (e.g., institutional capacity, local leadership, digital literacy).

The coefficient's positive trend is logically aligned with previous research demonstrating that digital governance boosts transparency (SDG 16), improves inter-institutional cooperation (SDG 17), and promotes inclusive public service delivery (SDG 10). This also reflects the findings from the Binh Dinh case study (Nguyen, 2025), where intentional investments in digital platforms resulted in administrative change and improved developmental outcomes.

Constant Term and Model Diagnostics

The constant term was statistically insignificant ($\beta = -0.5009$, $p = 0.965$), exhibiting broad confidence ranges, which is anticipated and not of main concern. Model diagnostics reveal a satisfactory overall fit and residual distribution: the Durbin-Watson value (0.978) indicates an absence of significant autocorrelation, while the Omnibus and Jarque-Bera tests affirm the normality of residuals.

The coefficient plot (table 1) substantiates the statistical interpretation: GDP per capita has a distinctly significant impact, but the confidence interval for e-governance intersects with zero, indicating statistical imprecision.

4.3. Broader Interpretation and Theoretical Reflection

– H1 (Direct Impact of E-Governance on SDG Preparedness): Statistically unsupported, although directionally consistent.

– H2 (Sustained impact of e-governance while accounting for economic development): The effect was not sustained at conventional levels when GDP was incorporated.

– H3 (Spatial spillovers): Not examined in this work yet theoretically warranted for subsequent investigation.

Theoretical Implications

The results contest the reductionist premise that digital governance can independently provide significant improvements in Sustainable Development Goals (SDG) performance, particularly without accompanying socioeconomic and institutional frameworks. Although e-governance can serve as an enabler or multiplier, economic capacity seems to be the more predominant driver at the provincial level in Vietnam. This result substantiates the institutional-policy theoretical paradigm utilised in this study, which asserts that governance quality functions in tandem with economic and administrative infrastructure.

The statistically insignificant coefficient for egov_score may also be partially ascribed to measurement constraints. Citizen-assessed scores, while helpful, may not comprehensively reflect institutional reality or backend administrative efficacy. Moreover, provinces with recent yet uninstitutionalized digital changes may be undervalued in PAPI data.

Integrating qualitative indicators like institutional digital maturity or ICT expenditure may enhance future models. Furthermore, the Technology Acceptance Model (TAM), although effective in elucidating individual adoption behaviour, may require modification for application at the institutional level a concern highlighted in the literature review.

4.4 Policy Implications

Although the data on e-governance as an independent predictor is ambiguous, this study possesses significant policy implications:

– Targeted Interventions: Provinces with high GDP but low SDG scores may be underperforming in governance, emphasising the need for institutional strengthening rather than economic investment alone.

– Red Zone Monitoring: The approach enables the identification of "red zones" provinces where e-governance scores are deficient relative to anticipated SDG advancement. These domains should be prioritised for digital transformation initiatives, especially those emphasising transparent procurement, public involvement, and interoperable service delivery.

– The findings indicate the need to enhance composite indicators to better reflect detailed and practical aspects of governance quality, including institutional agility, audit compliance, and interaction with national platforms.

– Data Infrastructure: Policymakers and academics should invest in longitudinal datasets to facilitate causality-oriented designs (e.g., panel data analysis, difference-in-differences models) that more effectively capture the temporal dynamics of reform and development.

4.5. Future Research Directions: The Case for Spatial Econometrics

One noteworthy shortcoming of the current investigation is the absence of spatial modelling. Considering Vietnam's inter-provincial partnerships, cross-border economic networks, and policy diffusion mechanisms, spatial dependence is both theoretically substantiated and practically credible.

Subsequent research should develop a spatial lag model (e.g., SAR or SLX) to assess the impact of Sustainable Development Goal (SDG) development in one province on adjacent provinces. This would provide formal testing of H3 and may uncover regional governance clusters or spillover effects from successful provinces.

For instance, if provinces like Da Nang or Binh Duong function as innovation centres, their methodologies may be replicated by other provinces, thereby generating ripple effects in governance capabilities and developmental results.

This work provides a comprehensive empirical analysis of the relationship between province e-governance and SDG readiness in Vietnam, utilising newly assembled data and HC3-corrected regression models. The results emphasise the primary influence of economic capacity on SDG outcomes, while also indicating the potential although statistically ambiguous impact of e-governance.

These observations confirm the intricacy of sustainable development governance and warn against excessive dependence on single-variable assessments. Instead, comprehensive policy design that integrates digital transformation with economic and institutional strengthening remains the most realistic approach to attaining the 2030 Agenda in Vietnam.

Future work incorporating spatial dynamics, longitudinal data, and institutional case studies will further enhance the precision and policy value of this line of research.

5. CONCLUSION

This research aimed to explore the connection between the quality of provincial e-governance and the readiness for Sustainable Development Goals (SDGs) throughout Vietnam, utilising a policy-focused institutional framework and a cross-sectional econometric methodology.

Utilising secondary data from the PAPI 2024, VASS-UNDP SDG Index, and GSO GDP records, the analysis combined digital governance performance and economic development as explanatory variables to elucidate provincial variations in SDG achievement.

The study was structured around three hypotheses: (H1) that elevated e-governance scores would correlate with increased SDG readiness; (H2) that this relationship would remain significant when accounting for economic capacity; and (H3) that governance and SDG outcomes in one province might influence neighbouring regions through spatial spillover effects. The regression model yielded compelling evidence of a strong and statistically significant influence of economic capacity on SDG outcomes. However, the effect of e-governance, while showing a positive direction, did not achieve statistical significance in the present specification. Consequently, H1 and H2 did not receive conventional levels of support, although they continue to be theoretically substantiated. The empirical testing of Hypothesis H3 was not conducted in this study; however, it presents an intriguing avenue for future spatial modelling endeavours.

The findings highlight the complex and multifaceted aspects of sustainable development. Although the quality of governance, especially in the realm of digital governance, is often lauded as a catalyst for change, its impacts seem to depend on more profound institutional, economic, and regional factors. The findings underscore the necessity of synchronising governance reforms with both technical advancements and the prevailing socioeconomic contexts, as well as fostering inter-provincial coordination mechanisms. The study presents a replicable empirical framework and paves the way for the integration of spatial econometrics into SDG readiness research, an area that has not been thoroughly examined in existing Vietnamese and regional policy literature.

At a practical level, The analysis provides policymakers with valuable insights that facilitate the prioritisation of interventions. Instead of adopting a uniform digital transformation strategy, initiatives should focus on “governance red zones” where enhancements in e-governance can drive wider development benefits, particularly when integrated within regional economic systems. The research illustrates how cross-sectional evidence, despite its limitations, can contribute to the iterative design of policies and pinpoint areas that necessitate the enhancement of institutional capacity.

Final, This research provides empirical evidence and theoretical enhancement to the discussion on governance and sustainable development in emerging economies. As Vietnam progresses towards its 2030 Sustainable Development Goals, future research should enhance these foundations by utilising longitudinal data, examining spatial interdependencies, and incorporating qualitative case studies to elucidate the intricate mechanisms by which digital governance reforms yield developmental outcomes. E-governance, however not statistically predominant in this model, is essential; when strategically utilised, it can enhance inclusive, responsible, and regionally cohesive advancement towards sustainable development.

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EVALUATING STUDENT-LED PROJECTS ALIGNED WITH THE SDGS: INSIGHTS ON AWARENESS, ENGAGEMENT, AND EDUCATIONAL IMPLICATIONS

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ABSTRACT

Integrating the Sustainable Development Goals (SDGs) into student projects is an important approach in higher education to promote interdisciplinary thinking and sustainability engagement. This study evaluates outcomes of student-led projects in *Project Design 1 (PD1)* and *Project Design 2 (PD2)* courses at Ho Chi Minh City University of Economics and Finance. Using a 5-point SDG impact scale and Bloom's Taxonomy, the research examines project alignment with the 17 SDGs and contributions to the three sustainability pillars: economic, social, and environmental and analyzes students' awareness and sense of responsibility regarding SDGs, using Bloom's Taxonomy as an analytical framework. Findings show PD1 projects addressed a wider range of SDGs with balanced attention to economic and social aspects, especially in innovation and urban issues. PD2 projects focused mainly on economic goals such as entrepreneurship (SDG 8) and sustainable production (SDG 12), with less engagement in social and environmental dimensions. Both groups demonstrated understanding and application of SDG concepts, but PD1 students showed greater critical thinking and analysis. The study highlights the importance of course design and institutional support in fostering holistic SDG learning and meaningful student contributions to sustainable development.

Keywords: Bloom's Taxonomy, project design, sustainable development goals (SDGs), sustainability pillars.

1. INTRODUCTION

The 2030 Agenda for Sustainable Development, adopted by United Nations Member States in 2015, established 17 interconnected Sustainable Development Goals (SDGs) as a universal framework for addressing systemic challenges such as poverty, inequality, and climate change (United Nations, 2015). These goals emphasize the integration of economic growth, social equity, and environmental stewardship, requiring transformative approaches across all sectors. Higher education institutions have emerged as critical actors in this process, serving as hubs for knowledge generation, curriculum innovation, and community engagement (Filho et al., 2024). This study investigates how project-based learning (PBL) fosters SDG literacy and actionable competencies among undergraduate students, with a focus on cognitive development patterns and institutional support mechanisms at a Vietnamese university.

The Transformative Role of Universities in SDG Implementation

Universities are uniquely positioned to bridge theoretical knowledge and practical sustainability solutions. Beyond traditional education and research functions, they act as living laboratories for testing interdisciplinary approaches to complex socioecological challenges (Filho et al., 2024). The SDGs provide a shared language for aligning institutional missions with global priorities, enabling universities to measure their societal impact through both curricular and operational initiatives. Recent studies demonstrate significant variations in SDG implementation across European institutions, where disciplinary silos and competing administrative priorities often hinder holistic approaches (Filho et al., 2024). In developing economies, universities face additional challenges including limited faculty training in sustainability pedagogy and bureaucratic inertia in curriculum reform (UNDP, 2022).

Project-based learning has gained prominence as a pedagogical strategy for SDG integration, particularly for developing critical thinking and systems-based problem-solving skills. By engaging students in real-world sustainability challenges, PBL fosters deeper understanding of goal interdependencies while cultivating competencies in stakeholder collaboration and ethical decision-making (Anderson & Krathwohl, 2001). However, existing literature reveals a predominant focus on curricular content rather than cognitive development processes, with few studies examining how

course design influences students' engagement depth across SDG dimensions (Filho et al., 2024). This study addresses this gap by analyzing both thematic alignment with SDGs and the progression of sustainability-related cognitive skills using Bloom's revised taxonomy.

Cognitive Development Through Sustainability Education

Bloom's taxonomy provides a robust framework for evaluating how educational interventions shape engagement with complex sustainability concepts. The revised model – remembering, understanding, applying, analyzing, evaluating, and creating – emphasizes the transition from foundational knowledge acquisition to higher-order thinking skills essential for addressing wicked problems (Anderson & Krathwohl, 2001). In PBL contexts, this translates to designing assignments that challenge students to critique existing systems, weigh competing priorities, and prototype context-specific solutions. Introductory courses typically prioritize awareness-building and basic application skills, while advanced programs emphasize critical analysis of goal interdependencies and ethical implications (UNDP, 2022).

The cognitive demands of SDG-aligned projects vary significantly based on institutional support structures and course objectives. This study's two-tiered course structure – Project Design 1 (PD1) and Project Design 2 (PD2) – enables comparative analysis of how scaffolded learning experiences influence engagement depth. PD1 introduces interdisciplinary problem-solving through design thinking frameworks (Nguyen et al., 2024), while PD2 focuses on developing market-ready solutions using innovation models (Nguyen et al., 2022). This structure provides unique insights into pedagogical strategies that enhance holistic understanding of the SDGs' economic, social, and environmental dimensions.

Methodological Innovations and Contextual Challenges

Assessing the sustainability impact of student projects requires tools that accommodate the qualitative and contextual nature of SDG implementation. The SDG Impact Assessment Tool (IAT), developed by the Gothenburg Centre for Sustainable Development, facilitates structured evaluation of project impacts across all 17 goals while encouraging reflection on unintended consequences (Gothenburg Centre for Sustainable Development, 2020). This study adapts the IAT to educational contexts, creating a dual-axis framework that measures both thematic alignment with SDGs and cognitive engagement levels. The 5-point scale evaluates project outcomes from basic awareness (Level 1) to sustainable impact generation (Level 5), addressing a critical gap in PBL assessments that often prioritize outputs over learning processes.

Recently, rapid urbanization and economic growth intensify pressures on higher education systems to produce graduates capable of addressing region-specific sustainability challenges. The UNDP's 5Ps framework (People, Planet, Prosperity, Peace, Partnership) emphasizes the need to adapt global goals to local realities while maintaining fidelity to core principles (UNDP, 2022). Academic literature that categorizes the 17 SDGs into the three core pillars of economic, social, and environmental, to find relevant mappings and classifications beyond the 5Ps model (Purvis et al., 2019.Vietnamese universities face unique barriers including limited industry partnerships and resource constraints, which this study's case institution – Ho Chi Minh City University of Economics and Finance – addresses through iterative curriculum design and community collaborations.

Research Objectives and Contributions

This study examines three core questions:

1. How do student-led projects align with the economic, social, and environmental dimensions of SDGs?
2. What cognitive engagement patterns emerge when analyzing student outcomes through Bloom's revised taxonomy?
3. How can course design optimize SDG integration in PBL curricula?

By combining quantitative analysis of 830 student projects with qualitative assessments of cognitive development, the research provides actionable insights for educators designing SDG-aligned programs. Preliminary findings indicate that early exposure to interdisciplinary projects fosters broader SDG engagement, while advanced courses risk narrowing focus to economic dimensions without deliberate design interventions. The subsequent sections detail the methodological framework, comparative analysis of PD1 and PD2 outcomes, and recommendations for enhancing sustainability

pedagogy through community partnerships and policy alignment. This work contributes to global debates about higher education's role in the 2030 Agenda, offering evidence-based strategies for cultivating graduates equipped to navigate sustainable development complexities.

2. BACKGROUND

Sustainable Development Goals (SDGs)

According to the United Nations (2015), the 2030 Agenda for Sustainable Development, adopted by United Nations Member States in 2015, is a global action plan centered around 17 Sustainable Development Goals (SDGs). These goals aim to eradicate poverty, reduce inequality, improve the quality of healthcare and education, promote economic growth, and respond to climate change. The SDGs build upon and continue previous international efforts such as Agenda 21 (1992), the Millennium Declaration and MDGs (2000), the Johannesburg Declaration (2002), and the outcomes of the Rio+20 Conference (2012). Today, the SDGs play a crucial role in guiding and measuring sustainable development across all countries. They not only address urgent current challenges but also contribute to shaping a prosperous, equitable, and sustainable future for generations to come. The SDGs are not just goals to aspire to, but also a source of inspiration, setting a clear vision for global sustainability (Giller et al., 2018).

For universities, the SDGs serve not only as an academic orientation, but also as an opportunity to strengthen their role as knowledge hubs - through teaching, research, management (Filho et al., 2021) and community engagement - to help address global issues and educate a new generation of citizens equipped with sustainable thinking, action-oriented skills, and a deep sense of responsibility for the future.

The SDGs are guided by four key principles (UNDP, 2022): inclusiveness, ensuring no one is left behind; indivisibility, recognizing the interconnected nature of global issues; universality, applying equally to all countries and rooted in shared values; and transformative change, addressing root causes through systemic solutions, local engagement, and appropriate technology. These principles help shape impactful, sustainable actions and continuous improvement.

The "three pillars" concept of sustainable development (economic, social, and environmental: Figure 1) is widely used in academia, policy, and business. Although the diagram is simple and easy to understand, the model has been criticized for being vague and lacking a solid theoretical foundation. Nevertheless, it remains a common interpretation in sustainability literature, including during the formulation of the United Nations' Sustainable Development Goals (SDGs) (Purvis et al., 2019).

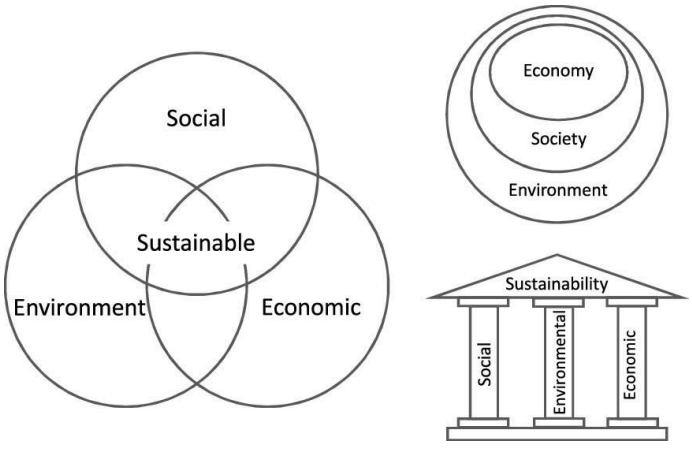


Figure 1. The "three pillars" concept of sustainable development.

Alignment with SDGs

According to the UNDP (2023), aligning the projects with the SDGs connects local action to a global movement, offering a shared language to address common challenges. The SDGs provide a framework for innovation, collaboration, and integrated planning across all areas of sustainable development. As local governments play a vital role in driving change, aligning with the SDGs helps ensure effective, holistic, and impactful solutions – because the more local the action, the more real the impact. To ensure SDG alignment, a project should meet two key criteria: inclusion, by

identifying and addressing the needs of all affected groups - especially the vulnerable - and environmental sustainability, by avoiding harm and promoting circular resource use instead of linear consumption (UNDP, 2022).

This research uses the SDG Impact Assessment Tool (IAT) developed by Gothenburg Centre for Sustainable Development (2020) to assess the impact of each SDG on student-led projects with a focus on three pillars of sustainable development: economic, social, and environmental. This tool uses six categories, namely: direct positive impact, indirect positive impact, no impact, indirect negative impact, direct negative impact, and more knowledge needed. The current study adapts the SDG IAT with some changes to assess the impact of student-led projects, using a 5-point scale: Not related or harmful (0), raises awareness only (1), shows understanding, unclear impact (2), offers solutions with growth potential (3), measures clear positive impact (4), and delivers sustainable results with strong partnerships (5).

Bloom's Taxonomy

Bloom's revised Taxonomy outlines six cognitive levels of learning: remembering, understanding, applying, analyzing, evaluating, and creating. These stages move from basic recall to higher-order thinking, supporting critical thinking, problem-solving, and the creation of new ideas (Anderson & Krathwohl, 2001). This research assesses students' awareness and engagement with SDGs via Bloom's Taxonomy of PD1 and PD2 courses focusing on those six cognitive levels of learning.

Project Design courses

Project Design (PD), comprising PD1 and PD2, has been offered at Ho Chi Minh City University of Economics and Finance (UEF) since 2017 to bridge the gap between academic learning and labor market demands in the Industry 4.0.

The courses use the design thinking framework to cultivate critical thinking, problem-solving, and innovation. PD1 introduces a logical, interdisciplinary project design process through a combination of Problem-Based and Project-Based Learning, encouraging creative, team-based solutions to real-world challenges in a learner-centered environment aligned with SDG themes frameworks (Nguyen et al., 2024). PD2 builds on this foundation by guiding students in developing innovative startup projects using the 5 Disciplines of Innovation model from Stanford Research Institute (SRI) International, with a focus on important market needs, value creation process, and competition (Nguyen et al., 2022).

3. METHODOLOGY

The research was conducted using both quantitative and qualitative methods, combining primary data analysis and secondary literature review. The objective is to assess the level of connection between student group projects and the 17 SDGs and the three main pillars of sustainable development (economic, social, and environmental), thereby reflecting students' awareness and engagement towards the SDGs.

The research subjects are first and second-year university students enrolled in the PD1 and PD2 courses at Ho Chi Minh City University of Economics and Finance (UEF), Vietnam. These two courses require students to work in groups to develop and implement practical real-world projects, which integrate content related to sustainable development. The total number of students participating in the survey is 830 (PD1: 435, PD2: 395).

Before developing the survey tool, the research team conducted a synthesis and analysis of academic documents, international reports, and guidelines from the United Nations related to the SDGs, methods for classifying SDGs according to the pillars of sustainable development, and previous works on integrating SDGs into higher education. At the same time, studies on Bloom's Taxonomy a in developing student awareness were also referenced to build the theoretical framework for the research. These documents play a crucial role in shaping the content of the theoretical basis, designing the survey, as well as analyzing the results.

After completing the project report, students evaluate the impact of the group project on each SDG goal through an online survey form (Google Form). The form consists of 17 questions, each corresponding to one SDG goal, assessing the project on a scale from 0 to 5 points, which is based on the SDG IAT tool (Gothenburg Centre for Sustainable Development, 2020). The evaluation scale is presented in Table 1 below.

Table 1. The evaluation scale.

Points	Details
0 point	The project is not related to the SDGs or has a negative impact.
1 point	The project is indirectly related to the SDGs, only raising awareness, with no clear impact.
2 points	The project demonstrates understanding of the SDGs, has ideas but the impact is unclear or not sustainable.
3 points	The project applies an interdisciplinary approach, has specific solutions to address at least one SDG goal and potential for expansion.
4 points	The project measures the positive impact of the SDGs, producing significant practical results.
5 points	The project demonstrates practical actions to address the SDGs, shows collaboration with the community/business, and has a large and sustainable impact.

Data from the form is automatically linked to an Excel spreadsheet, where calculations and analysis tools have been pre-established to process the data and create visual representations.

4. DATA ANALYSIS & DISCUSSION

The average score of the contributions of student innovation projects to the SDGs is calculated for each goal from 0 to 5. This helps identify the SDGs that students prioritize integrating into their projects. The average scores of each pillar are summarized to determine which pillar is prioritized the most by students. The scores between PD1 and PD2 are compared to identify changes in students' levels of interest over the course of study. From students' open-ended feedback of the survey, their awareness and responsibility towards sustainable development issues are identified. Then the development of students' awareness is assessed using the Bloom's Taxonomy through six levels: Remember, Understand, Apply, Analyze, Evaluate, and Create.

Tables and radar charts are automatically generated from Excel to visualize the relevance between the projects and each SDG, as well as the level of contribution according to each pillar. These charts are used in the final presentation, final report, and project poster of the students and serve as input data for the comprehensive analysis of the research to clarify trends and students' awareness levels regarding the SDGs.

SDG Alignment

The analysis of data from 830 students enrolled in two courses, PD1 (435) and PD2 (395), reveals an uneven alignment between student projects and the SDGs. The findings are presented at two levels: PD1, PD2, which is summarized in Table 2 below.

Table 2. Comparison of PD1 and PD2 student survey results on SDG alignment.

Individual SDGs	SDG Pillar	PD1	PD2
		Score (0-5)	
SDG 1: No Poverty	Social	1.02	2.68
SDG 2: Zero Hunger	Social	0.90	0.71
SDG 3: Good Health and Well-being	Social	2.52	1.90
SDG 4: Quality Education	Social	2.42	1.24

SDG 5: Gender Equality	Social	1.42	0.50
SDG 6: Clean Water and Sanitation	Environment	1.57	0.79
SDG 7: Affordable and Clean Energy	Social	2.22	1.14
SDG 8: Decent Work and Economic Growth	Economy	2.68	4.03
SDG 9: Industry, Innovation and Infrastructure	Economy	3.88	3.28
SDG 10: Reduced Inequality	Economy	1.54	0.55
SDG 11: Sustainable Cities and Communities	Social	3.59	1.87
SDG 12: Responsible Consumption and Production	Economy	1.91	3.94
SDG 13: Climate Action	Environment	2.28	1.21
SDG 14: Life Below Water	Environment	1.13	0.60
SDG 15: Life on Land	Environment	1.74	1.43
SDG 16: Peace & Justice Strong Institutions	Social	1.73	0.45
SDG 17: Partnerships to achieve SDGs	Social	2.50	2.35

Analysis of PD1 student projects shows a clear focus on specific SDGs (Figure 2), notably SDG 9 (3.88), SDG 11 (3.59), SDG 8 (2.68), and SDG 3 (2.52). These reflect students' preference for practical, urban-related topics with accessible resources. SDG 9 leads due to strong interest in tech innovation and product design, aligning with their technical background. SDG 11 highlights urban concerns like smart transport and waste management. SDG 8 features startup and livelihood projects, showing career-driven thinking. SDG 3 includes health education and wellness initiatives, reflecting attention to well-being.

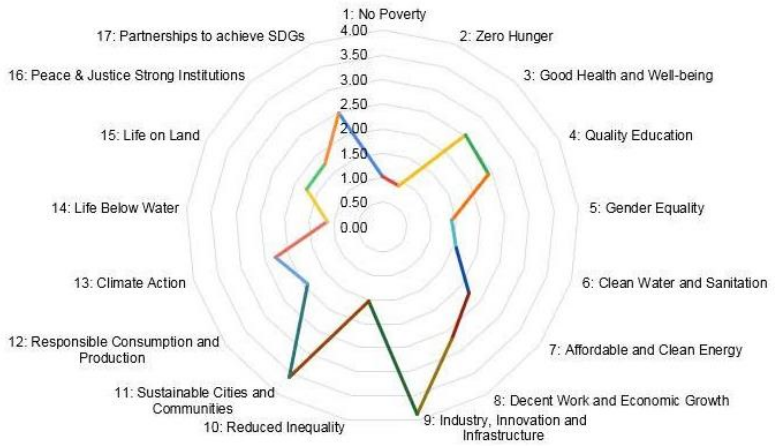


Figure 2. SDG alignment levels in PD1 projects.

In contrast, Figure 2 shows that SDG 2 (0.90), SDG 1 (1.02), SDG 14 (1.13), and SDG 5 (1.42) receive lower scores due to limited relevance to students' urban context and course themes. SDGs 1 and 2 involve systemic social issues often beyond students' access and timeframe. SDG 14 is hindered by the lack of marine-related content in an inland setting. SDG 5 sees low engagement due to its sensitive nature and limited integration into the curriculum. These results show that students gravitate toward SDGs that are practical, accessible, and well-aligned with course content - highlighting the need for broader teaching resources and community partnerships to enable engagement with the full range of SDGs.

Analysis of 395 PD2 student projects (Figure 3) shows a strong focus on economic SDGs, especially SDG 8 – Decent

Work and Economic Growth (4.03), SDG 12 – Responsible Consumption and Production (3.94), and SDG 9 – Industry, Innovation and Infrastructure (3.28). These align with students' strengths in business models, product design, and innovation, allowing for tangible outcomes within a semester. SDG 8 reflects interest in entrepreneurship and livelihoods, while SDG 12 highlights concern for sustainability and behavior change. SDG 9 continues to attract attention for its relevance to technology and infrastructure. Some attention was also given to SDG 17 – Partnerships for the Goals (2.35) and SDG 3 – Good Health and Well-being (1.90), showing awareness of collaboration and community health.

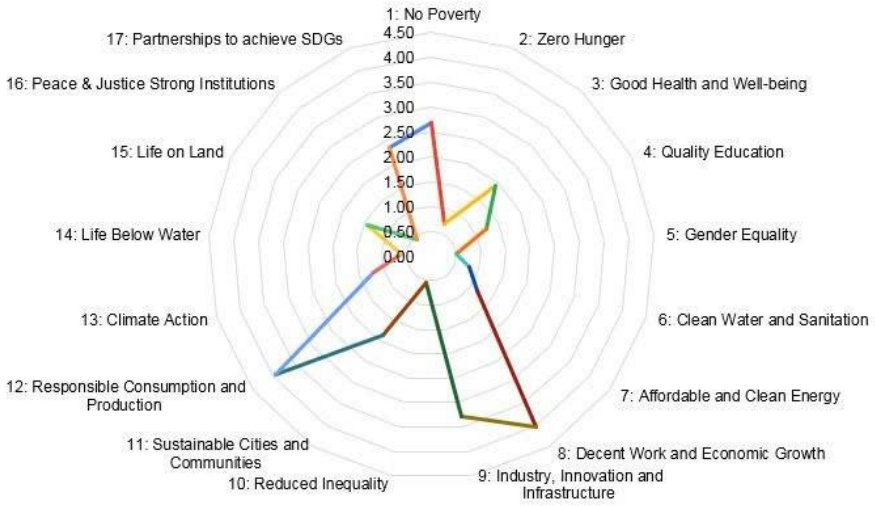


Figure 3. SDG alignment levels in PD2 projects.

In contrast, several SDGs scored below 1.0 – SDG 2, 5, 6, 10, 14, and 16 - due to their complexity, limited accessibility, or weaker alignment with course themes. These goals often require interdisciplinary knowledge, engagement with vulnerable groups, or focus on systems outside students' direct experience, such as marine ecosystems or institutional structures. Overall, students gravitate toward SDGs that are practical and aligned with their skills and project constraints. Broader engagement across all SDGs may require curriculum adjustments, real-world exposure, and interdisciplinary support to help students tackle more complex sustainability challenges.

A comparison of PD1 and PD2 projects shows distinct patterns in SDG alignment. PD1 students explored a wider range of topics, including innovation (SDG 9), urban issues (SDG 11), employment (SDG 8), and health (SDG 3). PD2 students focused more narrowly on economic goals, especially entrepreneurship and sustainable production (SDG 8 and 12). Both courses showed limited engagement with complex social and environmental SDGs, with PD2 scoring even lower - highlighting the influence of course design on how students engage with sustainability.

A deeper analysis of the level of awareness and assessment of social impact in student projects reveals significant differences between the two modules, PD1 and PD2. Among the 435 students in PD1, approximately 21% of the projects scored 3 points or higher for Sustainable Development Goals (SDGs) under the social pillar - most notably SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 11 (Sustainable Cities and Communities). These projects not only identified relevant issues but also proposed practical solutions, demonstrating attention to factors such as equitable access, long-term sustainability, and differences among beneficiary groups. Notably, SDG 11 had the highest average score in the social category (3.59 points), reflecting students' strong interest in relatable issues such as public transportation, urban environments, waste management, and living spaces.

Conversely, projects in PD2 showed limited engagement with social SDGs. Of the 395 participating students, only about 9% of the projects scored 3 points or higher in this goal category. Many projects primarily described ideas at a general level, remaining at a foundational understanding (1-2 points), and did not delve into specific social impact analysis. Goals such as SDG 5 (Gender Equality), SDG 10 (Reduced Inequalities), and SDG 16 (Peace, Justice, and Strong Institutions) all recorded average scores below 0.6, indicating that students lacked the appropriate tools or perspectives to effectively integrate these themes into their project development. Notably, very few PD2 projects achieved a score of 4 or 5 in the social goal category - a level that would indicate the ability to measure real-world impact or establish clear community linkages.

This disparity not only reflects differing levels of interest in social issues between the two modules but also highlights their distinct approaches to sustainable development. PD1 projects were often situated in multidimensional, real-world contexts, allowing students to analyze and discuss trade-offs between efficiency, cost, and social equity. Meanwhile, PD2 projects - focused on product and market development - tended to prioritize economic factors and commercialization potential, while inadequately integrating social considerations into their ideation process.

Sustainability Pillars

Analysis of student projects across PD1 and PD2 reveals distinct patterns in engagement with the three sustainability pillars: Economic, Social, and Environmental, shaped by course themes and project scopes. In PD1, where projects focused on metro system issues, the Economic pillar scored highest (3.88), followed by Social (3.59), and Environmental (2.28). Students addressed cost, efficiency, and user experience, reflecting both technical and social considerations. However, environmental aspects were underexplored, likely due to limited data and minimal emphasis on transport's climate impact (Figure 4). In PD2, focused on innovating traditional local products, the Economic pillar dominated (4.03), while Social (2.68) and Environmental (1.43) scores lagged. Projects prioritized business improvement and marketability, with only surface-level attention to cultural or social dimensions, and minimal consideration of environmental impacts like sourcing or waste (Figure 5).

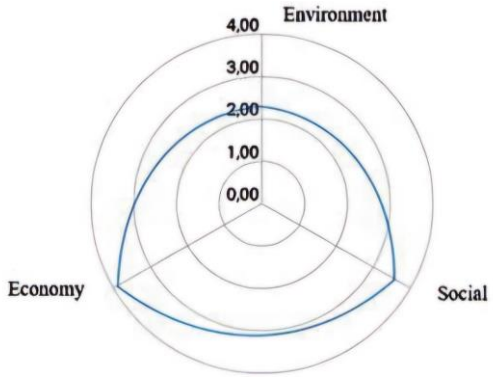


Figure 4. SDG pillar alignment in PD1 projects.

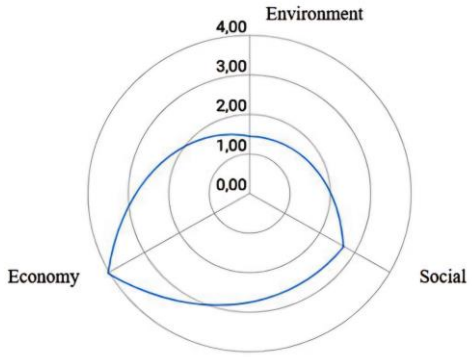


Figure 5. SDG pillar alignment in PD2 projects.

Comparing these two courses, PD1 show more balance between economic and social aspects, while PD2 leans strongly toward economic goals. Additionally, PD1 shows a more balanced engagement with all three sustainability pillars, especially the social dimension – fitting for its focus on public transportation and social equity. In contrast, PD2 leans heavily toward the economic pillar, reflecting its emphasis on product commercialization, but revealing gaps in social and environmental awareness within the innovation process. The difference likely stems from the distinct design and focus of each module. PD1, as a foundational course, encourages students to explore social and urban issues through design thinking, fostering creative solutions tied to real-world contexts. Its broader thematic scope and emphasis on multidimensional engagement help students develop analytical skills and assess social trade-offs in their designs. Conversely, PD2 emphasizes market needs, value propositions, and competition. Its evaluation criteria prioritized feasibility and economic efficiency, effectively promoting entrepreneurial thinking. However, this focus leads students to concentrate more on business challenges, with less attention to the social and environmental impacts of their solutions. These findings highlight the role of course structure in shaping students' sustainability perspectives and the need for more integrated support to foster holistic engagement with all three pillars.

Students' Awareness and Engagement via Bloom's Taxonomy

To assess students' awareness and engagement with SDGs via Bloom's Taxonomy, student-led projects are mapped with their survey responses (Figure 2 and Figure 3) onto the six cognitive levels of Bloom's Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, and Create for PD1 and PD2 respectively (Table 3). By analyzing student outputs and reflections through this taxonomy, strengths in foundational knowledge and application, alongside opportunities are identified to deepen critical thinking and holistic sustainability integration. This helps gauge not only their knowledge of the SDGs but also how deeply they engage with sustainability concepts.

Table 3. Student awareness and engagement with the SDGs mapped to Bloom's Taxonomy.

Bloom's Taxonomy Level	PD1	PD2	Cognitive Focus	Comments
Remember	Strong recall of SDGs	Strong recall of SDGs	Recall and recognition of relevant concepts	Students can identify relevant SDGs aligned with their course topics.
Understand	Good conceptual grasp	Good conceptual grasp	Comprehension and explanation	Students grasp SDG concepts fitting their project themes.
Apply	Effective application	Effective application	Using knowledge in practical contexts	Projects show application of SDGs in urban innovation (PD1) and product development (PD2).
Analyze	Moderate analysis	Limited analysis	Breaking down information and examining relationships	PD1 projects analyze social and economic impacts; PD2 projects remain surface-level.
Evaluate	Emerging critical evaluation	Rare evaluation	Judging value and making informed decisions	In PD1 projects, students evaluate social trade-offs, but in PD2, they often lack critical assessment of the broader impacts of their projects.
Create	Innovative solutions	Innovative solutions	Generating new ideas and products	Both produce creative outcomes, but sustainability integration is uneven, especially in PD2.

Table 3 shows both PD1 and PD2 students grasp SDGs basics and apply them well. PD1 excels in analysis and balances economic and social issues; PD2 focuses on economic goals with less critical depth. Both innovate but lack strong social and environmental integration, especially PD2. PD1 encourages broad engagement tied to social equity, while PD2 emphasizes economic sustainability and entrepreneurship, needing more holistic focus.

5. CONCLUSION

This study assesses student-led projects aligned with the SDGs in PD1 and PD2 courses, focusing on the three pillars of sustainable development: economic, social, and environmental. Results show clear differences in SDG alignment and student engagement. PD1 projects covered a broader range of goals with balanced attention to economic and social issues, while PD2 focused mainly on economic objectives, with limited social and environmental engagement. Bloom's Taxonomy analysis cognitively indicates both groups understand and apply SDG concepts, but PD1 students demonstrate deeper analysis and critical thinking. The findings underscore the role of course design in shaping sustainability perspectives and call for more integrated, interdisciplinary approaches - particularly in PD2.

Integrating the Sustainable Development Goals (SDGs) into education is a positive step but insufficient for fostering deep, holistic understanding. This study recommends prioritizing experiential, interdisciplinary course design aligned with institutional policy to prepare graduates with sustainable mindsets for the 2030 Agenda. Faculty development is essential, with three proposed training modules: (1) Foundations of SDGs, focusing on global relevance and curriculum alignment; (2) Pedagogies for SDG Integration, emphasizing Project-Based Learning and Bloom's Taxonomy; and (3) SDG Impact Assessment, equipping educators with tools for evaluating project outcomes. Supporting materials – such as rubrics, case studies, and a community of practice – are also recommended.

The study's insights are valuable but limited by its sample of first- and second-year students at a single institution (UEF) and reliance on self-reported data. Broader research across diverse contexts, using external evaluations and longitudinal methods, is needed to assess long-term impact. Further exploration of how faculty training and pedagogy influence SDG engagement would strengthen future educational practices.

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THE IMPACT OF NATIONAL PRIDE AND SOCIAL RESPONSIBILITY ON CUSTOMER LOYALTY TO LOCAL PRODUCTS IN VIETNAM

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ABSTRACT

Customer loyalty plays a vital role in enabling businesses to achieve long-term success. This study explores the primary factors influencing customer loyalty toward locally produced goods in Vietnam. A quantitative research approach was adopted, utilizing probabilistic sampling to survey 399 Vietnamese adults from both urban and rural regions. The collected data were analyzed through descriptive statistics, reliability assessments, and multiple regression techniques. The results reveal positive associations between all independent variables and customer loyalty, ranked by strength of influence as follows: (1) National pride (NP) (0.423); (2) Perceived Quality (PQ) (0.307); (3) Social Responsibility (SR) (0.288); (4) Customer relationships (CR) (0.276) and (5) Satisfaction (SA) (0.079). These findings provide a foundation for policy decisions and marketing strategies aimed at fostering stronger consumer loyalty to local products.

Keywords: *Customer loyalty, Local products, Vietnam*

1. INTRODUCE

Customer loyalty toward domestically produced goods has become increasingly relevant in Vietnam, particularly as the nation emphasizes sustainable consumption and the advancement of its local economy (Nguyen et al., 2018). Previous studies have highlighted several influential factors contributing to this loyalty. Cultural ties and national identity are among the most significant, as consumers who feel a strong connection to Vietnamese traditions and express a desire to support the national economy are more inclined to favor local brands (Phan & Lye, 2020).

In addition to product characteristics, the nature of the relationship between customers and local businesses plays a substantial role in loyalty formation. According to Vu and Nguyen (2017), who performed qualitative interviews, emotional attachment, trust, and active participation in community-based activities all contribute to repeated consumer engagement. Businesses that prioritize personalized service and maintain a presence within their communities are more likely to develop lasting customer relationships.

Although previous research has shed light on various factors shaping consumer loyalty to local brands in Vietnam, several methodological and contextual limitations remain.

One major concern involves sampling practices. Many studies rely on convenience sampling, often leading to an overrepresentation of younger, urban respondents (Nguyen et al., 2018). This approach restricts the ability to generalize findings to broader populations, particularly those in rural areas whose purchasing behaviors may differ.

Another limitation stems from the use of cross-sectional designs. While these studies provide snapshots of consumer attitudes, they do not allow for the examination of how loyalty evolves over time in response to shifting economic conditions or targeted marketing strategies (Tran, 2019). A longitudinal approach would offer more nuanced insights.

Additionally, qualitative methods such as interviews and focus groups can be influenced by social desirability bias. Participants may overstate their support for domestic brands, driven by a sense of national pride rather than actual purchasing behavior (Vu & Nguyen, 2017).

A further constraint lies in the narrow industry focus of many investigations. Research often centers on sectors like retail banking (Vu & Nguyen, 2017) or grocery chains (Tran, 2019), which limits the applicability of findings across other product categories. Wider cross-industry comparisons are still needed.

Lastly, there is a geographic imbalance in the literature. A significant portion of studies have been conducted in southern Vietnam, largely overlooking the cultural and economic distinctions of the northern and central regions (Phan

& Lye, 2020). These differences could play a role in shaping loyalty patterns.

In summary, while earlier research offers a foundation, this study addresses existing gaps through the use of probabilistic sampling, a broader industry scope, and an emphasis on regional diversity. These improvements aim to provide a more comprehensive understanding of local brand loyalty within Vietnam's evolving market context.

2. THEORIES

2.1. Customer Loyalty

Customer loyalty plays a central role in shaping consumer decision-making and long-term brand engagement. At its core, loyalty refers to the extent to which individuals consistently prefer one brand over others, driven by satisfaction from previous experiences and a favorable attitude toward the company (Oliver, 1999). A loyal customer base brings several benefits, including repeat purchases, positive referrals, and stable demand, all of which contribute to lasting business success (Reichheld, 2003).

2.2. Local products

Local products are defined as goods manufactured and sold within specific geographic regions by domestic enterprises (Nguyen et al., 2018). These products often embody cultural heritage, as they are created using techniques, designs, or materials rooted in local traditions that have been preserved across generations (Nguyen et al., 2021). A distinguishing feature of such items is their artisanal production; they are typically handmade in small batches using non-mechanized methods, requiring specialized craftsmanship (Phan & Vuong, 2020). Collaborations between local brands and artisan communities further amplify their cultural authenticity, fostering economic opportunities while celebrating traditional skills.

2.3. Attitude-Behavior Theory

This theoretical framework suggests that customer loyalty is primarily influenced by attitudes, which themselves are shaped by beliefs regarding brand attributes and overall brand evaluations (Ajzen, 1991). When attitudes are favorable, they tend to result in repeated purchasing behaviors and a resistance to switching brands (Jalilvand et al., 2011). Attitudes develop from consumers' positive or negative evaluations of engaging in a specific behavior (Ajzen, 1991). For instance, a consumer's attitude toward a brand can be affected by their perceptions of its quality, pricing, and social image (Jalilvand et al., 2011). Empirical studies have consistently demonstrated that attitudes serve as significant predictors of repurchase intentions and loyalty in various sectors. Research focusing on fast food restaurants identified attitude as the most influential factor driving customer behavioral loyalty, surpassing other variables (Jalilvand et al., 2011). Likewise, a favorable attitude toward a mobile phone service provider was linked to increased customer retention (Kim et al., 2016). By effectively managing brand perceptions and the attributes that influence attitudes, marketers can cultivate positive consumer dispositions toward their brand, thereby promoting repeated patronage, as this theory anticipates (Ajzen, 1991). Overall, attitude remains a fundamental precursor to customer loyalty.

2.4. Commitment-Trust Theory:

According to this theory, loyalty in customer-company relationships is primarily driven by relationship commitment and trust (Morgan & Hunt, 1994). Commitment is defined as the intention to sustain the relationship, whereas trust refers to the confidence in the exchange partner's reliability and integrity. Empirical evidence indicates that both commitment and trust play significant roles in fostering loyalty. For instance, research conducted on retail banks revealed that these factors not only directly improved customer retention but also indirectly did so by enhancing customer satisfaction (Ndubisi & Wah, 2005). Likewise, among mobile service users in Vietnam, commitment and trust were found to positively influence brand loyalty (Vu & Nguyen, 2017). Commitment arises from the benefits and investments within the relationship that create a binding effect, while trust is built upon qualities such as competence, honesty, and benevolence (Morgan & Hunt, 1994). By consistently providing exceptional value and establishing trust, companies can nurture the commitment and confidence necessary to reinforce customer loyalty.

2.5. Related studies

Recent studies have highlighted the unique characteristics and consumer behaviors in rural markets of Central and Northern Vietnam. Pham et al. (2023) found that consumers in these regions place a high value on product authenticity

and local heritage, which significantly influences their loyalty to local brands. Additionally, Nguyen and Tran (2024) emphasized the importance of community engagement and social responsibility initiatives in fostering loyalty among rural consumers. Nielsen Research (2016): This research shows that nearly 75% of global consumers consider brand origin to be an important factor when making a purchase. In particular, national pride is the most important factor for 21% of global consumers when buying local products, with the highest rates in the Asia-Pacific (24%) and Africa/Middle East (25%) regions. GlobalData Research (2022): This research shows that 80% of global consumers believe that independent brands are of high quality. The perception of superior quality and safety will drive the trend of supporting local products in the near future. Chauhan Research (2022): This research highlights that consumers tend to support local products due to the perception of higher quality and safety. This is especially important in the context of the cost of living crisis, when consumers are looking for the best value for their money.

2.6. Concept Model

Through the literature review and related studies the author has proposed a model of the factors affecting customer loyalty to local products in Vietnam (as shown in Figure 1)

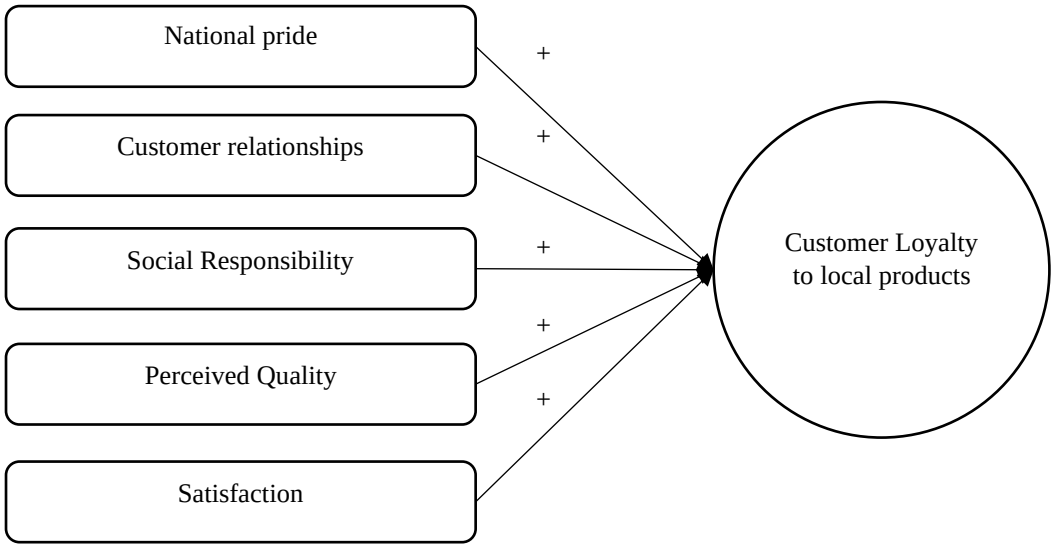


Figure 1: Conceptual framework

Research Hypothesis

Hypothesis H1: National Pride has a positive impact on Customer Loyalty for local products in Vietnam.

Hypothesis H2: Customer Relationships has a positive impact on Customer Loyalty for local products in Vietnam.

Hypothesis H3: Social Responsibility has a positive impact on Customer Loyalty for local products in Vietnam.

Hypothesis H4: Perceived Quality has a positive impact on Customer Loyalty for local products in Vietnam.

Hypothesis H5: Satisfaction has a positive impact on Customer Loyalty for local products in Vietnam.

3. RESEARCH METHOD

In this research, a mixed-method approach combining qualitative and quantitative research methods was utilized. This approach is deemed appropriate for gaining a holistic understanding of the factors influencing customer loyalty within the specific cultural context of Vietnam.

As per Cochran's (1977) formula, the required sample size for the study is determined to be 385. A probabilistic selection approach will be employed as the sampling method. Participants will be randomly chosen from various regions in Vietnam to ensure a diverse representation within the sample. Recruitment strategies may involve engaging customers through local establishments, online surveys, and social media platforms.

After the completion of data collection, the quantitative survey responses will be coded and inputted into SPSS

software for analysis. Closed-ended interview questions will also be coded and entered into SPSS for further analysis. This process will facilitate the running of descriptive statistics on all variables, as well as the identification of any missing data, outliers, and adherence to normality assumptions.

To ensure internal consistency, reliability testing using Cronbach's alpha will be performed on each scale. Correlation analyses will be conducted to explore relationships between the identified factors. Additionally, multiple regression analysis will be utilized to assess the predictive capabilities within the study.

4. RESULT

4.1. Demographic Profile of the Respondents

Out of the total of 400 potential participants in the survey, all 400 responded to it. Upon receiving the completed questionnaires, a selection process was carried out to identify and exclude any invalid submissions. As a result, 3 questionnaires were deemed invalid due to multiple blanks and incompletely filled Likert scale scores. Consequently, 399 questionnaires were considered valid for the research data.

The demographic analysis revealed the following findings:

In terms of gender distribution, there were 224 male respondents, representing 56.1%, and 175 female respondents, accounting for 43.9%. This distribution indicates a fairly representative sample in terms of gender.

Regarding age distribution, there were 34 respondents aged 18-25 years (8.5%); 168 respondents aged 26-35 years (42.1%); 77 respondents aged 36-45 years (19.3%); 107 respondents aged 46-55 years (26.8%); and 13 respondents over 56-65 years (3.3%). This distribution also reflects a typical age profile within the surveyed sample.

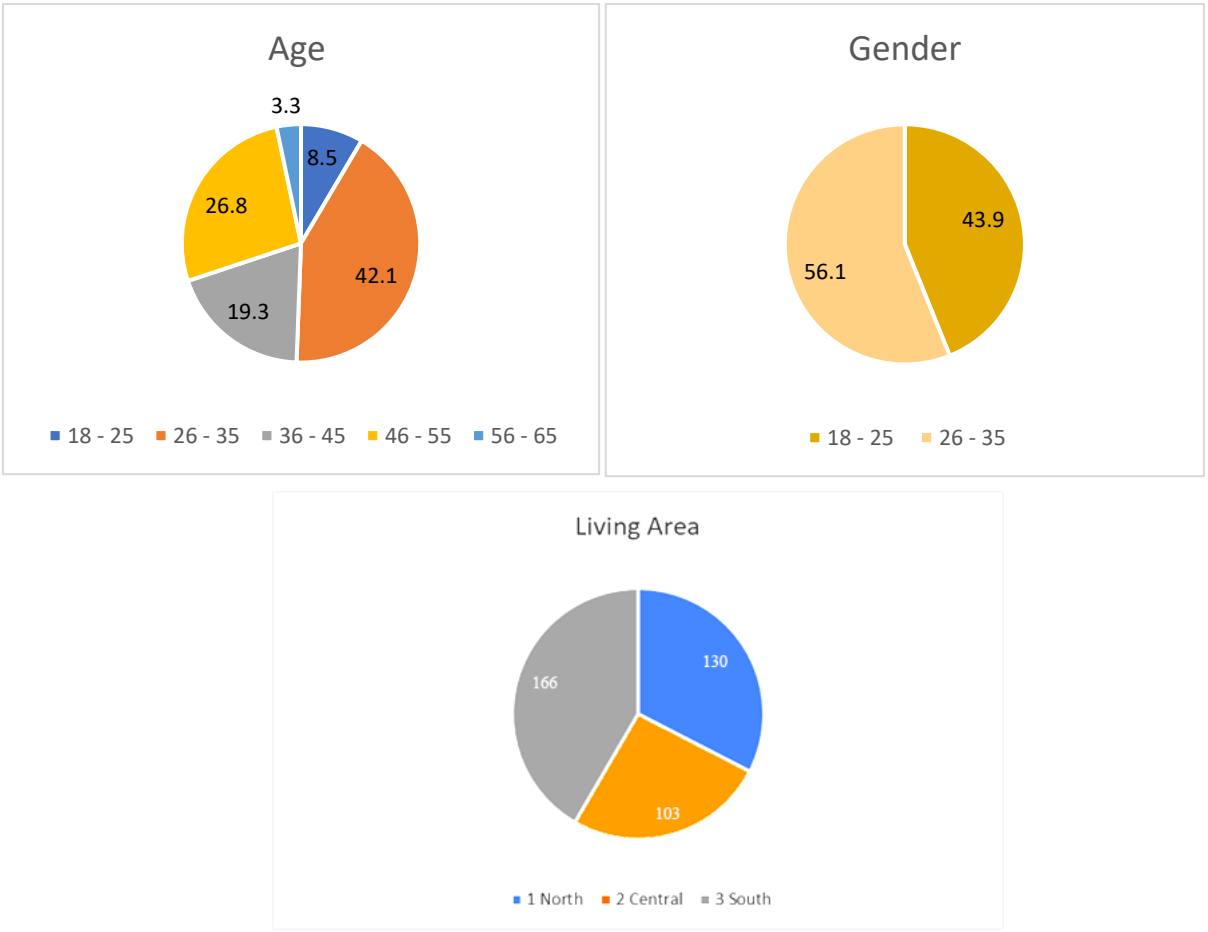


Figure 2: Demographic Profile of the Respondents

Regarding Living Area distribution represents the percentage of respondents from each region relative to the total number of respondents. There were, 32.6% of the respondents are from the North, 25.8% from the Central region, and 41.6% from the South.

4.2. Scales Validity Measurement

Generally, the coefficients of Cronbach's Alpha of the scales are quite high and vacillate from 0.796 to 0.926. The Corrected Item-Total Correlation of the scales over 0.3 meets the correlative norm (Nguyễn Đình Thọ, 2014). The outcome of the analysis of Cronbach's Alpha of the six scales is presented in Table 1.

Table 1. Scales Validity

Order	Scale	Cronbach's Alpha
1	National pride	0.841
2	Customer relationships	0.796
3	Social Responsibility	0.878
4	Perceived Quality	0.858
5	Satisfaction	0.871
6	Customer Loyalty to local products	0.926

4.3. Factors affecting customer loyalty to local products in Vietnam

Upon conducting the analysis of Cronbach's Alpha, five factors (considered as independent variables) comprising 21 observed variables were selected for the factor analysis. The KMO test coefficient calculated from the survey sample, as shown in Table 2, yielded a value of 0.842, indicating that the sample size is adequate for conducting factor analysis. Moreover, the Bartlett test, with a significant Sig. value of 0.000, revealed that the observed variables are correlated with each other across the total number of observations.

To identify the primary factors, the study employed a factor extraction method based on Eigenvalue. The results of the Exploratory Factor Analysis (EFA) indicated that the five factors accounted for 68.555% of the variation in the dataset, exceeding the threshold of 50%. Table 2 displayed that all observed variables exhibited Factor Loading coefficients greater than 0.5, confirming that the independent variables in the research model possess convergent and discriminant values.

Table 2. Factor analysis

	Component				
	1	2	3	4	5
NP2	,836				
NP1	,833				
NP4	,756				
NP3	,738				
NP5	,730				
CR2		,858			
CR1		,842			
CR3		,815			
CR4		,778			
SR1			,832		
SR3			,814		
SR2			,796		
SR4			,772		
SA1				,855	
SA4				,848	
SA3				,818	
SA2				,683	
PQ1					,850

PQ4					,844
PQ2					,740
PQ3					,527
Initial Eigenvalues	5,936	3,077	2,152	1,652	1,579
Cumulative %	14,74	28,954	42,804	56,581	68,555
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.					,842
Sig.					,000

4.4. Correlation analysis

There is the correlative verification of the variables in the model: between the dependent variables and the independent ones and between the independent ones and each other. Using the Pearson correlation coefficient is to quantify the close levels of the linear relationships between the two quantitative variables. If the absolute value of the Pearson coefficient is much closer to 1, the linear correlation of the two variables is much closer (Hoàng Trọng và Chu Nguyễn Mộng Ngọc, 2008). Table 3 summarizes the correlation of the Pearson statistics on the explication of the variables.

Table 3: Correlation between dependent and independent variables

Correlations							
		CL	NP	CR	SR	SA	PQ
Pearson Correlation	CL	1,000	,478	,569	,585	,420	,525
	NP	,478	1,000	,096	,086	,071	-,006
	CR	,569	,096	1,000	,411	,368	,342
	SR	,585	,086	,411	1,000	,445	,363
	SA	,420	,071	,368	,445	1,000	,264
	PQ	,525	-,006	,342	,363	,264	1,000
Sig. (1-tailed)	CL	.	,000	,000	,000	,000	,000
	NP	,000	.	,028	,043	,078	,455
	CR	,000	,028	.	,000	,000	,000
	SR	,000	,043	,000	.	,000	,000
	SA	,000	,078	,000	,000	.	,000
	PQ	,000	,455	,000	,000	,000	.

The correlation table presents the relationships between Customer Loyalty (CL) and five other variables: National Pride (NP), Customer Relationships (CR), Social Responsibility (SR), Satisfaction (SA), and Perceived Quality (PQ). The Pearson correlation coefficients indicate the strength and direction of the linear relationships between these variables, while the significance values (Sig.) indicate whether these correlations are statistically significant.

4.5. Linear MultiRegression Analysis

The relationships among the variables, as well as the connections between the independent variables (the influencing factors) and the dependent variable, are analyzed using linear multiregression analysis. This method is employed to predict the value of the dependent variable based on the values of the independent variables. The results of the multiregression analysis, utilizing the Enter method, yield an R^2 value of 0.722 and an adjusted R^2 value of 0.719. This indicates that 71.9% of the variation in customer loyalty to local products in Vietnam can be explained by the independent factors.

In the ANOVA analysis, the F value is reported as 204.281, which demonstrates significant statistical significance (Sig. $p<0.001$). Consequently, the null hypothesis, which posits the absence of a linear relationship, is rejected. This finding confirms that the multiregression model is appropriate for illustrating the relationships between the independent factors and customer loyalty to local products in Vietnam.

Table 4: Covariance analysis results

ANOVA[a]						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	56,486	5	11,297	204,281	,000[b]
	Residual	21,734	393	,055		
	Total	78,219	398			

The phenomenon of Collinearity of predict variables is presented on the right of Table 5. The VIF coefficient of the independent variables is mostly between 1.016 and 1.442; and the Tolerance value is from 0.693 to 0.984. That is, the independent level of the variables is quite high. Values of VIF coefficients (<10) and Durbin-Watson (1 < 2.144 < 3) show that the model does not have multicollinearity and does not have first-order autocorrelation between adjacent errors (Hoang Trong & Chu Nguyễn Mộng Ngọc, 2005).

Table 5: Regression Coeeficicents of the factors relating to customer loyalty to local products in Vietnam

		Model					
		1					
		(Constant)	NP	CR	SR	SA	PQ
Unstandardized Coefficients	B	,013	,263	,234	,212	,059	,215
	Std. Error	,125	,017	,026	,023	,023	,021
Standardized Coefficients	Beta		,423	,276	,288	,079	,307
t		,102	15,780	8,989	9,022	2,595	10,446
Sig.		,919	,000	,000	,000	,010	,000
Correlations	Zero-order		,478	,569	,585	,420	,525
	Partial		,623	,413	,414	,130	,466
	Part		,420	,239	,240	,069	,278
Collinearity Statistics	Tolerance		,984	,751	,693	,756	,816
	VIF		1,016	1,331	1,442	1,323	1,225

The coefficients indicate that the relative importance of the independent variables is put into the model to explicate CL because the significant level of p<0.05 (Table 5).

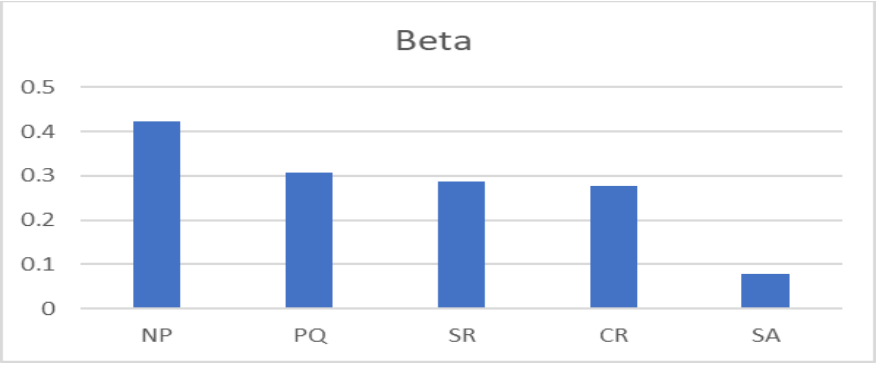


Figure 3: **The Beta coefficients**

The Beta coefficients point out the strength of the relationship between the independent variables and the dependent variable and are ranged in the following order: (1) National pride (NP) (0.423); (2) Perceived Quality (PQ) (0.307); (3) Social Responsibility (SR) (0.288); (4) Customer relationships (CR) (0.276) and (5) Satisfaction (SA) (0.079).

The low coefficient for Satisfaction (SA) in model suggests that while it does have a positive relationship with Customer Loyalty (CL), its impact is relatively weaker compared to other factors like National Pride (NP) and Perceived Quality (PQ). In some cases, customers might have high expectations for satisfaction, making it harder for satisfaction

alone to significantly influence loyalty. Segoro and Limakrisna (2020): This study found that service quality and customer relationships have a stronger impact on customer loyalty compared to mere satisfaction. This suggests that in some cases, other factors may play a more crucial role in maintaining customer loyalty.

Through the result of the test of the adjusted R2 parameters, F – test, t- test, and VIF meet the requirement, the model choice factors affecting the customer loyalty to local products in Vietnam with 05 factors are indicated as follows.

CL = 0.423NP + 0.307PQ + 0.288SR + 0.276CR + 0.079SA

5. CONCLUSION

In conclusion, developing a thorough theoretical understanding of customer loyalty and its application to local products in Vietnam lays a solid foundation for ongoing research on this crucial topic. By extensively reviewing academic literature across various disciplines and integrating complementary conceptual frameworks, this discussion has shed light on the complex, multifaceted nature of brand attachments and purchasing behavior.

Based on the research results, the author proposes some implications as follows:

Emphasize National Pride: Highlight the cultural heritage and national identity associated with local products. Use marketing campaigns that evoke a sense of pride in supporting Vietnamese traditions and the local economy. Partner with local artisans and cultural organizations to create products that reflect Vietnamese heritage. This can enhance the authenticity and appeal of the products.

Enhance Perceived Quality: Implement stringent quality control measures to ensure high standards. Communicate these efforts to customers through transparent labeling and certifications. Regularly collect and analyze customer feedback to identify areas for improvement and ensure that products meet consumer expectations.

Strengthen Customer Relationships: Offer personalized customer service to build strong relationships. Use customer data to tailor interactions and provide customized recommendations.

Community Engagement: Engage with local communities through events, sponsorships, and social media. Foster a sense of belonging and loyalty by being actively involved in community activities.

Promote Social Responsibility: Implement and promote sustainable practices such as eco-friendly packaging, ethical sourcing, and reducing carbon footprints. Highlight these initiatives in marketing campaigns.

Corporate Social Responsibility (CSR): Develop CSR programs that address local social issues. Communicate the impact of these programs to customers to build trust and loyalty.

Improve Customer Satisfaction: Provide excellent customer support to address any issues promptly. Ensure that customers feel valued and heard. Create loyalty programs that reward repeat customers. Offer incentives such as discounts, exclusive access to new products, and special events.

Overall, systematically reviewing this topic establishes a robust foundation for the theoretical framework guiding my continued social science investigation. Pursuing proposed avenues for empirical research aims to generate impactful implications, optimizing approaches for cultivating active, resilient local economies through strategically fostered regional attachments and brand loyalties.

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INTERDISCIPLINARY RESEARCH ON THE UTILIZATION OF TRADITIONAL PERFORMING ARTS IN CULTURAL TOURISM DEVELOPMENT: A CASE STUDY OF VIETNAM

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ABSTRACT

The paper explores the intersection of traditional performing arts and cultural tourism, particularly focusing on the utilization of Vietnam's rich intangible heritage as a resource for tourism development. It emphasizes the interdisciplinary approach required to balance the preservation of artistic traditions with the demands of modern tourism. The research highlights the importance of combining cultural management, tourism studies, and economics with technology and sociology to create effective strategies for integrating performing arts into tourism. The study reviews both international and domestic literature on this topic, identifying key trends such as heritage preservation, tourist experience enhancement, and destination branding. It further highlights the significant role of digital technology in promoting traditional arts, along with the need for community participation and sustainable tourism practices. The paper also underscores the importance of developing a comprehensive policy framework to manage the relationship between arts, heritage, and tourism. By presenting a holistic view, it advocates for an integrated, action-oriented research model that can effectively preserve and promote Vietnam's traditional performing arts in a rapidly evolving global tourism market.

Keywords: cultural heritage, cultural tourism, digital technology, interdisciplinary research, traditional Performing Arts

1. INTRODUCTION

Traditional performing arts, such as music, dance, and folk theater, are core elements of intangible cultural heritage that reflect the identity of communities and distinctive historical and artistic values. Today, these art forms have become significant resources for cultural tourism development worldwide. Integrating traditional performance programs into tourism products not only provides unique experiences for tourists but also contributes to the effective preservation and promotion of heritage. The development of cultural tourism has fostered the revival and continuity of many traditional art forms in countries with rich heritage.

In Vietnam, culture is considered a "unique resource" for national tourism. Traditional art forms like Đờn ca tài tử, Cải lương, Hát bội, Chèo, Ca trù, Nhã nhạc cung đình, and Múa rối nước have long attracted tourists due to their uniqueness and cultural richness. For example, the Water Puppet performance in Hanoi and the Nhã nhạc Court Music in Hue have become iconic cultural tourism products known internationally. However, not all traditional art forms are exploited effectively; many face the risk of fading away due to a lack of audiences, the pressure of modern entertainment, and challenges in suitable commercialization.

The utilization of performing arts in tourism presents a complex challenge of balancing preservation with development: preserving the authenticity and core values of the arts while adapting them to meet the needs of contemporary audiences and the tourism market. This issue requires an interdisciplinary approach, drawing from cultural management, the arts, tourism, economics, sociology, and even technology. Interdisciplinary research plays a key role in bridging different perspectives to propose comprehensive solutions. Numerous global studies have applied interdisciplinary methods when examining cultural tourism and heritage, demonstrating the advantages of this approach in analyzing multi-dimensional issues.

This paper aims to clarify the current state of research on this topic by conducting a systematic literature review of scientific works both domestically and internationally that relate to the exploitation of traditional performing arts in the development of tourism. It analyzes the main research trends globally and in Vietnam, compares research contexts, identifies gaps, and suggests appropriate interdisciplinary approaches for Vietnam.

2. THEORETICAL BASIS AND LITERATURE REVIEW

Interdisciplinary research is understood as a scientific approach that mobilizes knowledge and methods from various disciplines to address complex, shared problems. In the field of culture and tourism, interdisciplinary research is particularly necessary due to the interwoven nature of cultural, social, and economic factors. Cultural tourism is influenced by theories of tourism management, marketing, and local economic development, while being closely linked to issues of heritage conservation, community identity, anthropology, and the arts. Therefore, research on utilizing intangible cultural heritage (such as performing arts) to develop tourism must integrate perspectives from cultural management (to ensure authenticity and cultural value), tourism professionals (to meet market demands and enhance visitor experiences), and policymakers, among other stakeholders.

Globally, the interdisciplinary approach to cultural tourism research began to take shape in the 1980s as heritage tourism emerged as an important segment, requiring collaboration between conservation experts and tourism economists (McKercher & du Cros, 2002). Recent studies emphasize the need for a multidisciplinary approach. For example, Mazlan et al. (2025), through a scoping review method, highlighted the demand for an integrated, multidisciplinary approach to incorporate performing arts into cultural tourism policy and practice. Similarly, Rodzi, Zaki, and Subli (2013) discussed the relationship between tourism and intangible heritage, arguing that cross-sector collaboration is essential to reconcile tourism development with the preservation of traditional culture.

In Vietnam, in the context of globalization, researchers have recognized that the preservation of traditional arts cannot be separated from the development of sustainable tourism. Consequently, the current trend is to combine theories from cultural management (heritage, festivals, and arts) with theories from tourism studies (destinations, experiences, marketing) to more effectively analyze the exploitation of traditional arts for tourism. The interdisciplinary approach also allows for the examination of the role of digital technology in preserving and showcasing heritage (e.g., digitalization, augmented reality), a newly emerging intersection of information technology and cultural tourism.

In conclusion, interdisciplinary research provides a broad and flexible theoretical framework to address the topic of utilizing traditional performing arts in the context of tourism. It helps overcome the barriers of individual disciplines, creating opportunities to better understand the interplay between tourism activities and the preservation and promotion of intangible cultural heritage.

3. METHODOLOGY

This paper adopts a literature review method combined with comparative analysis to assess the research landscape regarding the exploitation of traditional performing arts in association with tourism development, from an interdisciplinary perspective. The materials were collected from reputable academic sources both domestically and internationally, including scientific articles, monographs, dissertations, theses, and conference proceedings. The contents of these materials cover a wide range of viewpoints, including art history, cultural values, management and policy, destination marketing, sustainable development, and tourist experiences.

After collection, the materials were categorized into two main groups: international research and research in Vietnam. Each group was further divided into subtopics, such as conservation and performance, product development, cultural and tourism policies, etc. Based on this structure, the paper analyzes the contents of each group to identify the objectives, methodologies, geographical scope, interdisciplinary approaches, key findings, and recommendations in each study.

For international work, special attention was given to innovative approaches such as the application of digital technologies, community-based tourism, and destination branding through performing arts. For domestic studies, the paper analyzes trends over time and by art forms, highlighting significant findings and limitations. Finally, the results of the analysis are compared between the two contexts to identify research gaps, providing a foundation for proposing appropriate interdisciplinary approaches for Vietnam soon.

4. RESULTS AND ANALYSIS

4.1. International Research Landscape

Globally, research on the integration of traditional performing arts into tourism development has significantly increased in the past two decades, alongside the growing interest in cultural heritage tourism and sustainable tourism.

International studies reveal a diverse range of approaches, reflecting the cultural and social specificities of each region and the evolving theoretical frameworks. Several notable trends include:

4.1.1.Heritage Preservation and Tourism

Many studies focus on balancing the preservation of traditional arts with tourism activities. Hashimoto (2003) conducted a seminal study in Japan, analyzing the relationship between "preservation and tourism" in the context of folk arts. The study highlights that while incorporating traditional arts into tourism can lead to commercialization and loss of authenticity, tourism simultaneously acts as a driving force for local communities to preserve and pass on traditional performance skills. Similarly, Rodzi et al. (2013) discuss the integration of tourism development with intangible heritage in Malaysia, emphasizing the need for policies that ensure cultural sustainability when exploiting traditional arts for tourism. These studies typically propose participatory heritage management frameworks, in which local communities and artisans actively participate in tourism operations, creating livelihoods while preserving cultural values (Asante, 2020).

4.1.2. Tourist Experience and Destination Branding

Another area of research examines the impact of traditional art experiences on tourists and destination branding. Zhou, Lei, and Yan (2021) found a positive relationship between participation in traditional art performances and the perceived image of the destination in Macau. Specifically, tourists who attended local art programs tended to have a deeper understanding of the culture and a more favorable impression of the destination. Similarly, Wasela (2023) emphasized that intangible cultural heritage (including performing arts) plays a key role in distinguishing and attracting cultural tourism. Unique traditional festivals and events can serve as branding for regions, contributing to destination positioning in the global tourism market. For example, the city of Avignon (France) is famous for the Avignon Theatre Festival, and Edinburgh (Scotland) is renowned for the Edinburgh Festival, both of which not only attract large numbers of visitors but also reflect the cultural identity of these cities (Amorim et al., 2020). Through surveys of tourist satisfaction and motivations, Amorim et al. (2020) found that the quality of cultural experiences significantly influences tourist satisfaction and their intention to revisit, implying that investments in improving traditional performances can enhance loyalty and effectively promote destinations.

4.1.3. Development of Cultural Tourism Products

Numerous international studies focus on successful models for transforming traditional arts into attractive tourism products. In Indonesia, Priyanto, Yuliyanto, and Musthofa (2018) explore the case of Saung Angklung Udjo in Bandung, a center for performing and teaching the traditional Angklung instrument, as a prime example of turning traditional art into a tourism attraction. The study found that combining live performances with interactive elements (such as allowing tourists to play instruments and dance) has been successful in attracting visitors and generating income for artisans while supporting cultural preservation. Similarly, in South Korea and China, cultural tourism villages where visitors can experience traditional performing arts (such as the Hahoe Mask Dance in Korea and shadow puppetry in China) have been studied as sustainable exploitation models (Hsiao & Chuang, 2015). These studies often highlight the role of creative adaptation, adjusting the form, duration, and context of performances to suit contemporary audiences while maintaining core cultural values. For instance, Hsiao and Chuang (2015) propose a model of collaboration between tourism and traditional culture development, emphasizing regional context analysis to determine appropriate development levels: some areas may preserve authenticity, while others may commercialize part of the performance.

4.1.4. Community Education and Local Involvement

A notable area of research is the use of traditional performing arts in community education and local development, viewing local communities as both beneficiaries and practitioners of heritage. Asante (2020) reports on a project in Ghana that uses community theatre as an educational tool for heritage preservation. Through the involvement of residents in creating scripts, rehearsing, and performing cultural stories, the project raised community awareness about heritage values while creating new community-based tourism products for tourists interested in learning about local culture. This research emphasizes that this approach helps connect communities, fosters cultural pride, and creates authentic experiences for tourists (Asante, 2020). On a larger scale, Jaeni (2023) proposes an arts communication model aimed at empowering communities through art-based tourism. This model implies close cooperation between artisans, cultural managers, and tourism enterprises to craft and deliver a shared cultural message to tourists, thereby creating livelihoods for communities

and preserving cultural identities.

4.2. Research Landscape in Vietnam

In Vietnam, research on the exploitation of traditional performing arts in tourism began to gain attention around the early 2000s, coinciding with the development of cultural tourism and the movement to preserve intangible heritage following Vietnam's participation in the UNESCO 2003 Convention. Before that, in the late 20th century, most research focused on single-disciplinary studies of traditional arts, primarily in the fields of art history, ethnomusicology, and cultural history. Works like those of Trần Văn Khải (1970) on Vietnamese theater, Vương Hồng Sển (1968) on the memoirs of traditional Vietnamese theater, and Trần Văn Khê (2001, 2005) on traditional Vietnamese music systematized knowledge and established the value of various ethnic art forms. These studies laid an important academic foundation, clarifying the origins, artistic characteristics, and social roles of various forms of traditional art (e.g., Cải lương, Chèo, Đờn ca tài tử, Ca trù). However, these studies did not address the tourism aspect.

Entering the 21st century, alongside the growth of the tourism industry and the need to exploit cultural heritage for tourism, increasingly more interdisciplinary research emerged, integrating tourism elements into the study of traditional arts. This research can be divided into two main areas: (1) studies focused on the preservation and promotion of performing arts (where tourism is just one avenue for promotion), and (2) studies focused specifically on the exploitation of arts in tourism.

4.2.1. Preservation and Promotion of Traditional Arts

Many theses and dissertations focus on evaluating the current state and proposing solutions for the preservation of traditional performing arts in the context of contemporary society. For example, Mai Mỹ Duyên (2007) conducted a doctoral thesis on Đờn ca tài tử in the culture of Southern Vietnam, elucidating the artistic value and role of this art form in the community across different periods. Duyên's research provides in-depth ethnographic data, indirectly suggesting that Đờn ca tài tử has significant potential for cultural tourism development due to its communal and improvisational nature. Similarly, Nguyễn Đức Hiệp and Nguyễn Lê Tuyên (2013) studied the formation of Cải lương from Hát bội and Đờn ca tài tử in the late 19th and early 20th centuries, highlighting the cultural fusion in the history of Vietnamese theater. Although these works do not directly address tourism, they provide critical insights into the core values and social contexts of traditional arts, ensuring that future tourism initiatives respect cultural identity.

Simultaneously, studies on cultural management and policy regarding performing arts are significant. Lê Thị Hoài Phương (2023), in her book on Vietnamese performing arts during the Doi Moi period, examines the changing cultural policies from 1945 to the present, analyzing the challenges in preserving traditional arts (such as Tuồng, Dân ca ví giặm, Đờn ca tài tử, and Cải lương) under the influence of the market economy. The findings indicate that state policies have gradually shifted from state-supported arts to mobilizing social resources, encouraging the diversification of activities, which has created opportunities for art forms to participate in the tourism market, while highlighting the need for mechanisms that support artisans and cultural units in adapting. Overall, this research provides a macro view of the operational environment of traditional arts, emphasizing the importance of policy and management in both preserving and enabling art to engage in activities like tourism.

4.2.2. Research on Exploiting Traditional Arts in Tourism

This category of research is most directly relevant to the topic of the paper and includes various ministry-level projects, master's theses, and scientific articles from around 2010 onwards. Most studies focus on specific forms of art or specific regions to explore the potential for tourism exploitation. Notable works by region include:

– Northern Vietnam: Trần Thị Huyền (2012) investigated the exploitation of Ca trù values in the Red River Delta for tourism development, one of the first studies connecting intangible heritage with tourism after Ca trù was recognized by UNESCO in 2009. The author analyzed the status of Ca trù clubs in Hanoi, Hải Dương, etc., and proposed tourism tours combining Ca trù performances with visits to historical sites, contributing to the revival of this art form in contemporary life. Similarly, Trần Thị Minh (2012) conducted research on exploiting water puppet art in the Red River Delta. Water puppetry, already a popular tourist attraction (e.g., Thăng Long Water Puppet Theatre serving tourists in Hanoi), was expanded to include traditional rural puppet guilds. The author proposed linking traditional water puppet guilds in Thái Bình, Hải Phòng, and Bắc Ninh into a cultural tourism route while improving the content of performances

to attract international tourists. These proposals were later partially implemented through puppet performances at museums or local tourism festivals.

– Central Vietnam: Tăng Chánh Tín (2013) studied the integration of traditional music into tourism in Da Nang, focusing on folk songs, folk chants, and bài chòi from Quảng region. This study surveyed tourists' awareness of local folk music and proposed several sample performance programs for tourists in Da Nang. The results showed that tourists, particularly international visitors, were interested in folk performances if they were presented in a lively and understandable way. The author recommended establishing fixed folk performance spaces at key tourist attractions in the city to allow easier access for visitors (Tăng Chánh Tín, 2013). Also, in Central Vietnam, Huỳnh Thị Kim Bình (2017) conducted research on exploiting the heritage value of hát bội and bài chòi for tourism in Bình Định – a region with a tradition of martial arts and bài chòi. The study proposed creating tourism products that combine watching hát bội performances, playing bài chòi, and experiencing local cuisine and martial arts, forming a unique cultural experience to attract tourists to Bình Định (Huỳnh Thị Kim Bình, 2017).

– Southern Vietnam: The Southern region, especially the Mekong Delta, is the cradle of Đờn ca tài tử and Cải lương – two art forms that have early been recognized for their potential in tourism. After Đờn ca tài tử was honored by UNESCO in 2013, numerous studies on its preservation and promotion followed. Notably, Hà Văn Siêu (2014) proposed solutions to bring Đờn ca tài tử to tourists and develop specific tourism products based on this art form. The study emphasized the need to regularly organize Đờn ca tài tử performances at key tourist sites in the Mekong Delta (e.g., Cần Thơ, Bạc Liêu), train tour guides knowledgeable about this art form to explain to tourists and create homestay tours where visitors can interact with locals and enjoy Đờn ca tài tử in natural settings. Huỳnh Công Tín (2015) examined the preservation and promotion of Đờn ca tài tử in the Mekong Delta, proposing several recommendations such as opening community-based training programs and creating study tours for young people to foster a new audience market. Regarding Cải lương, Phạm Văn Ngoạn (2015) studied the exploitation of Cải lương in the Mekong Delta for tourism. Survey results showed that Cải lương had not been exploited systematically: Cải lương troupes rarely organized performances specifically for tourists, and tourists mainly saw Cải lương through festival events. The author proposed establishing a Cải lương performance center in Cần Thơ – the capital of the Mekong Delta – to regularly host classic Cải lương excerpts with English subtitles for international visitors (Phạm Văn Ngoạn, 2015). Several other master's theses expanded on these topics, such as Lê Hồng Tú (2017), who researched Đờn ca tài tử in tourism activities in the Mekong Delta, systematizing tourism models incorporating Đờn ca tài tử (e.g., garden tours with Đờn ca tài tử performances) and evaluating their effectiveness, proposing to improve the artistic quality and tourist experience.

Overall, domestic research has comprehensively addressed various traditional art forms and their potential for tourism exploitation across regions. A clear strength is the richness of case studies and the deep understanding of local cultural contexts. Each study typically provides detailed information about the history and status of art forms at the local level, while also offering practical proposals tailored to specific local conditions. However, there are also notable limitations. First, in terms of methodology, many domestic studies primarily use qualitative methods and descriptive analysis, with few quantitative studies or statistical analysis on audience preferences and the economic impact of cultural tourism products. This limits the persuasive power of the findings, as there is almost no research quantifying how much a specific art form being incorporated into tourism increases visitor numbers or revenue, or its long-term impact on the local community. Second, most studies approach the topic from either a cultural or tourism perspective rather than truly interdisciplinary angles. Many theses are conducted at cultural or tourism departments, which leads to an approach influenced by the students' field of study, either focusing on culture (with less attention to the market aspect) or tourism (with less focus on artistic value). Interdisciplinary collaboration is still limited to borrowing concepts from each other rather than having interdisciplinary teams working together. Third, there is a significant gap in research regarding the application of modern technology and communication methods in promoting traditional performing arts to tourists. In the context of the digital transformation, using social media and video platforms (such as YouTube and TikTok) to introduce traditional arts to tourists is crucial, but these aspects have not been addressed much in research. Additionally, there has been no study on the potential application of AR/VR technology at cultural destinations in Vietnam, although such technologies are being explored internationally. Finally, the practical effectiveness of the proposals from research is rarely monitored. Many studies provide recommendations, but there is little information on whether they have been implemented

or what the results were, leading to a lack of feedback that could help refine further research.

4.3. Suggested Interdisciplinary Approaches for the Context of Vietnam

Based on the identified research gaps, the author proposes several practical interdisciplinary approaches for research and practice in Vietnam as follows:

Firstly, there is a need to shift from isolated studies to a collaborative multidisciplinary model, bringing together experts from cultural studies, tourism, economics, technology, and communication right from the research design phase. The "Four stakeholders" model - comprising the government, scholars, theaters, and tourism professionals - should be emphasized to ensure that real-world perspectives are effectively reflected in the solutions.

Secondly, research should be action-oriented, combining practical pilot programs and on-the-ground impact assessments. Designing community-based cultural tourism pilot programs (such as a "day as a folk artist" experience) can help refine models based on feedback from local communities and tourists.

Thirdly, it is essential to integrate digital technology and modern communication methods into all solutions. From building a digital database of art forms and developing cultural tourism apps to leveraging social media for promotion and online ticket sales, all of these contribute to effectively reaching younger audiences and new markets.

Fourthly, research should focus on sustainable development and ensure meaningful community participation. The Cultural Impact Assessment (CIA) framework can be applied to assess the long-term impact on the cultural environment and the lives of residents.

Fifthly, there should be an increased emphasis on learning from international experiences through cross-cultural comparative research. Drawing from successful models of exploiting traditional performing arts in countries like Japan, China, South Korea, and Thailand will help identify elements that can be adapted to Vietnam's conditions.

In conclusion, the interdisciplinary approach appropriate for Vietnam should be dynamic, with multiple stakeholders actively involved in practice and open to integrating insights from other fields and international experiences. Only in this way can traditional performing arts truly become a resource for tourism development in a creative, effective, and sustainable manner.

5. DISCUSSION AND IMPLICATIONS

5.1. Discussion

The integration of traditional performing arts into tourism development, as explored in this paper, highlights a dynamic and evolving area of interdisciplinary research. As seen from both international and domestic studies, the field is characterized by complex interactions between cultural preservation, tourism, and economic development. These interactions require a careful balancing act to ensure that traditional art forms remain authentic and culturally significant while also becoming viable assets in the tourism industry. This discussion synthesizes key findings, explores their implications for research and practice, and proposes directions for future work in this interdisciplinary domain.

5.1.1. Interdisciplinary Approaches: A Necessity for Holistic Solutions

The need for interdisciplinary research in the integration of traditional performing arts into tourism is increasingly apparent. As traditional art forms intersect with various fields such as culture, tourism, economics, technology, and communication, research that draws from these diverse disciplines is essential to fully comprehend and address the challenges and opportunities involved. The current body of research has shown that while there is a growing recognition of the need for interdisciplinary approaches, many studies still operate within disciplinary silos. For instance, studies in cultural heritage and traditional arts often prioritize authenticity and cultural integrity, while tourism studies tend to focus more on market-driven concerns such as tourism satisfaction and revenue generation.

The implications of this divide are significant. To move towards a more effective integration of traditional arts into tourism, future research must actively foster collaboration between scholars in the fields of cultural studies, tourism management, economics, and technology. Such collaboration will enable a more nuanced understanding of how traditional arts can be both preserved and commercially viable, leading to more sustainable tourism practices. The application of interdisciplinary frameworks is not only essential for theoretical advancements but also for the practical implementation of policies that balance the interests of local communities, tourists, and cultural preservation.

5.1.2. Quantitative Research and Impact Assessment: The Need for Measurable Data

While qualitative research has provided rich insights into the cultural and social value of traditional performing arts, there remains a significant gap in quantitative studies, especially those that assess the economic, social, and environmental impacts of integrating arts into tourism. Current research often lacks measurable data on the direct and indirect effects of traditional arts on tourism revenue, local employment, and community well-being. Quantitative studies could provide much-needed evidence that supports the development of tourism policies and practices grounded in measurable outcomes.

The implications of this gap are twofold. First, without quantitative data, it is difficult to make a compelling case for policymakers and tourism stakeholders about the financial and social benefits of preserving and promoting traditional arts within tourism frameworks. Second, the lack of robust impact assessments makes it challenging to evaluate the long-term sustainability of these initiatives. Future research should aim to develop key performance indicators (KPIs) that measure not only the economic benefits but also the social and cultural impacts of traditional arts in tourism. These KPIs could include metrics such as visitor satisfaction, community engagement, cultural preservation rates, and economic outcomes for local artisans and businesses.

5.1.3. Technology Integration: Bridging the Gap Between Tradition and Modernity

The rapid advancement of digital technologies presents both a challenge and an opportunity for the tourism sector, particularly in the context of promoting traditional performing arts. While some international studies have begun to explore the use of technologies such as augmented reality (AR), virtual reality (VR), and social media to enhance cultural tourism experiences, research in this area remains limited, especially in the Vietnamese context. These technologies have the potential to enhance tourist engagement by providing immersive and interactive experiences, allowing visitors to explore traditional arts in innovative ways.

The implications for research and practice are clear: integrating digital tools into traditional cultural tourism could create new opportunities for audience engagement, particularly among younger, tech-savvy tourists. However, there is a need for further exploration of how digital technologies can be effectively applied to traditional performing arts without compromising the integrity of the art forms themselves. Researchers should explore the potential of digital storytelling, virtual exhibitions, and interactive apps to enhance the visitor experience and broaden the reach of traditional arts. Furthermore, the application of AI and machine learning could provide personalized tourism experiences, tailoring performances and narratives to individual preferences and behaviors. Future studies should investigate the feasibility, costs, and benefits of these digital innovations for cultural tourism.

5.1.4. Community Participation and Sustainable Development

Community involvement remains a cornerstone of both cultural heritage preservation and sustainable tourism. The active participation of local communities in the creation, performance, and management of traditional arts is crucial for ensuring the authenticity and sustainability of cultural tourism initiatives. Research has shown that when local communities are involved in tourism-related activities, they are more likely to see tangible benefits, such as improved livelihoods and increased pride in their cultural heritage.

The implications for practice are significant: tourism initiatives that incorporate community participation are more likely to succeed in the long term. However, there is a need for more research on effective models of community-based tourism that empower local people while ensuring that their cultural practices are protected. The concept of "participatory heritage management," as discussed in international studies, should be expanded and adapted to the Vietnamese context, where local communities can take on a more active role in curating and presenting their own cultural narratives. Furthermore, the long-term sustainability of these initiatives depends on ensuring that they do not exploit or commodify traditional arts but rather support their preservation and continued development in a way that benefits both the community and tourists.

5.1.5. Policy Development and Governance Models

Effective governance and clear policy frameworks are essential for the successful integration of traditional arts into tourism. While some research has focused on the role of government policies in supporting cultural tourism, there remains a gap in the development of comprehensive governance models that address the specific needs of both the tourism industry

and cultural heritage sectors. Current policies often lack coordination between cultural, tourism, and local government authorities, leading to fragmented approaches that hinder the successful implementation of cultural tourism initiatives.

The implications for future research are clear: there is a need for the development of integrated policy frameworks that clearly define the roles and responsibilities of all stakeholders involved, from government agencies to local artisans and tourism operators. Collaborative governance models that incorporate the perspectives of all relevant stakeholders - such as the "Four stakeholders" model (government, scholars, theaters, and tourism professionals) - should be further explored. Such models would ensure that policies not only support the economic development of tourism but also prioritize the preservation of cultural heritage and the well-being of local communities.

5.2. Research Gaps

The exploration of traditional performing arts in the context of cultural tourism development reveals several important gaps in current research. These gaps not only highlight the limitations of existing studies but also offer valuable opportunities for advancing interdisciplinary research in the field. Identifying and addressing these gaps is essential for developing more comprehensive, nuanced, and impactful strategies for integrating traditional arts into sustainable tourism practices.

5.2.1. Limited Interdisciplinary Integration

One of the most significant gaps in the current body of research is the insufficient application of a truly interdisciplinary approach. While existing studies often intersect fields such as culture, tourism, and economics, they tend to remain compartmentalized within individual disciplines. For instance, cultural studies frequently focus on the preservation and intrinsic value of traditional arts, whereas tourism studies concentrate on market-driven concerns such as product development and consumer experience. This fragmented approach restricts the depth of analysis and prevents a holistic understanding of the complex relationship between traditional arts and tourism. A truly interdisciplinary model should integrate perspectives from various fields, including technology, communication, sociology, and business, to create more dynamic and adaptable frameworks.

5.2.2. Lack of Quantitative Studies and Impact Assessment

Another significant gap is the scarcity of quantitative research, especially in terms of evaluating the economic, social, and cultural impacts of incorporating traditional performing arts into tourism. While qualitative studies often provide valuable insights into cultural values, the lack of numerical data and measurable outcomes weakens the ability to assess the real-world effectiveness of these initiatives. For instance, there is little research that quantifies the number of tourists attracted by specific traditional art forms or the revenue generated from such cultural products. Additionally, longitudinal studies that track the long-term impacts on local communities, both economically and socially, are notably absent. The development of metrics, such as visitor satisfaction, revenue generation, and cultural preservation, would provide essential data for policymakers, stakeholders, and researchers.

5.2.3. Insufficient Focus on Young Audiences and Niche Markets

The current literature predominantly focuses on general tourist populations without sufficiently addressing the preferences and behaviors of younger generations or niche audiences. The younger demographic, particularly Generation Z, represents a crucial segment of cultural consumers who are increasingly shaping global tourism trends. However, there is a lack of research into how younger tourists perceive and engage with traditional performing arts, especially in the context of digital platforms and interactive experiences. Similarly, niche markets such as academic tourists, cultural enthusiasts, or international artists have not been adequately studied. Research in this area could help tailor tourism products to more specific audiences, thereby enriching the cultural tourism experience and broadening its appeal.

5.2.4. Underutilization of Digital Technology in Cultural Tourism

In the era of digital transformation, one of the most glaring gaps in the research is the underutilization of digital technology in promoting traditional performing arts for tourism purposes. While there has been some exploration of digital tools in the broader tourism sector, the application of technologies such as augmented reality (AR), virtual reality (VR), and artificial intelligence (AI) to enhance cultural experiences remains largely unexplored. Digital platforms like YouTube, TikTok, and Instagram provide excellent opportunities for reaching younger, tech-savvy audiences, yet few

studies have examined their potential in promoting traditional arts. Additionally, there is a lack of research into the effectiveness of VR/AR in virtual heritage tours, where tourists could interact with 3D reconstructions of traditional performances. This represents a significant opportunity for innovation in cultural tourism, combining the preservation of tradition with the demands of modern technology.

5.2.5. Inadequate Evaluation of Policy and Governance Models

Research on policy frameworks and governance models for integrating traditional performing arts into tourism remains underdeveloped. While some studies address the role of government and cultural institutions in managing heritage, there is little systematic analysis of how policies could effectively facilitate the integration of traditional arts into tourism. There is a lack of clear models for collaboration between various stakeholders, including cultural ministries, tourism agencies, local communities, and the private sector. Effective policy frameworks are essential for ensuring the sustainable development of cultural tourism while preserving the authenticity of traditional art forms. The absence of comprehensive policy analysis and intersectoral collaboration models means that many initiatives remain isolated and lack the necessary support to achieve long-term success.

5.2.6. Need for Contextual Research in Diverse Cultural Settings

While much of the research on traditional performing arts and tourism focuses on specific regions or countries, there is a need for more comparative, cross-cultural studies. Research in regions such as Africa, Latin America, and parts of Southeast Asia remains sparse, despite the rich cultural traditions present in these areas. Conducting research in diverse cultural settings would offer new insights into how different societies adapt their traditional arts for tourism, providing valuable lessons for global practices. Additionally, understanding how local cultural values and social dynamics influence tourism exploitation of performing arts in these regions could lead to more culturally sensitive and contextually relevant strategies.

5.2.7. Long-Term Monitoring and Evaluation of Practical Proposals

Finally, another critical research gap is the lack of long-term monitoring and evaluation of the practical implementation of proposed models and policies. While numerous studies provide valuable recommendations for integrating traditional arts into tourism, there is often little follow-up on whether these suggestions are implemented or what the results have been. The absence of post-implementation studies means that there is limited feedback to refine existing models or develop new strategies. Long-term evaluation would allow researchers to assess the effectiveness of various initiatives and provide valuable insights into the sustainability of integrating performing arts into tourism in different contexts.

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

The integration of traditional performing arts into cultural tourism represents a promising yet complex interdisciplinary research area. As this paper has demonstrated, the intersection between traditional arts and tourism requires not only an understanding of the cultural, social, and economic dimensions but also the application of diverse methodological approaches. From the review of both international and domestic studies, it is evident that the potential for cultural tourism, driven by the preservation and promotion of traditional arts, is vast. However, the effective implementation of this potential requires addressing several critical gaps and challenges.

International research highlights the importance of a holistic, interdisciplinary approach that incorporates cultural management, tourism, technology, economics, and social sciences to ensure the sustainable and authentic integration of traditional arts into tourism. While international studies have made considerable strides in this regard, research in Vietnam and similar contexts remains underdeveloped, particularly in terms of interdisciplinary collaboration, quantitative impact assessments, and the integration of digital technologies. The lack of comprehensive policy frameworks, as well as insufficient community involvement, also hinders the development of sustainable models for cultural tourism.

The analysis of both international and domestic studies reveals key opportunities for improving the integration of traditional performing arts into tourism. These include fostering more robust interdisciplinary approaches, expanding research into digital technologies, improving community engagement, and developing more effective policy models. The

importance of balancing the preservation of authenticity with the economic needs of the tourism industry remains a central challenge. As such, a sustainable and effective model for utilizing traditional performing arts in tourism requires an approach that is flexible, inclusive, and contextually relevant to the specific cultural and social dynamics of each location.

6.2. Recommendations

6.2.1. Adopt a Comprehensive Interdisciplinary Approach

Future research should move away from single-discipline studies and adopt a more integrated, interdisciplinary approach. This means bringing together scholars from cultural studies, tourism management, economics, technology, and social sciences to create more comprehensive models that address the multifaceted nature of traditional arts and tourism. The use of the "Four Stakeholders" model - government, scholars, cultural institutions, and tourism operators - should be promoted to ensure that practical and academic perspectives are equally represented in the design and execution of research and tourism programs.

6.2.2. Incorporate Quantitative Research and Impact Assessment

There is a clear need for more quantitative research to assess the economic, social, and cultural impacts of integrating traditional performing arts into tourism. Future studies should incorporate measurable metrics such as visitor numbers, revenue generation, local economic benefits, and visitor satisfaction. Additionally, longitudinal studies should track the long-term effects on local communities, including changes in employment, cultural preservation, and social cohesion. Developing Key Performance Indicators (KPIs) specific to cultural tourism would provide valuable data for policymakers and stakeholders, enabling them to make informed decisions.

6.2.3. Integrate Digital Technologies into Cultural Tourism

The role of digital technologies in cultural tourism has been largely underexplored in the context of traditional performing arts. The integration of tools such as augmented reality (AR), virtual reality (VR), and digital storytelling can offer immersive experiences that enhance tourist engagement with traditional arts. Future research should focus on the development of digital platforms, such as mobile apps and online content, that allow tourists to interact with traditional art forms before, during, and after their visits. Furthermore, research should explore the potential of social media platforms like TikTok, Instagram, and YouTube as marketing tools to promote traditional arts to younger audiences.

6.2.4. Enhance Community Participation and Empowerment

The active involvement of local communities is essential for the sustainability and authenticity of cultural tourism initiatives. Research should focus on creating models that ensure meaningful community participation, where local artisans, performers, and residents play an active role in the curation and management of tourism products. Community-based tourism initiatives, such as cultural workshops, performances, and immersive experiences, can help preserve traditional arts while generating economic benefits for local populations. Ensuring that these initiatives are equitable and inclusive will foster a sense of ownership and pride among community members, making cultural tourism more sustainable.

6.2.5. Develop Comprehensive Policy Frameworks for Cultural Tourism

A significant gap in both international and domestic research is the lack of clear and integrated policy frameworks for managing the relationship between traditional arts and tourism. Future research should focus on developing comprehensive governance models that outline the roles and responsibilities of various stakeholders, including government bodies, cultural institutions, tourism operators, and local communities. These models should emphasize collaboration and coordination between sectors to ensure that cultural tourism initiatives are well-supported, sustainable, and aligned with broader development goals.

6.2.6. Expand Research on Global Best Practices

There is a need for further comparative studies to explore successful international models of integrating traditional performing arts into tourism. By examining the experiences of countries such as Japan, South Korea, and Thailand - where cultural tourism is a significant sector - researchers can identify strategies and practices that are

transferable to the Vietnamese context. In addition, comparative studies between countries with different cultural, economic, and social dynamics can help refine and adapt best practices to suit local needs and conditions.

6.2.7. Focus on Sustainable Development and Long-term Impacts

Future research must emphasize sustainable development principles and the long-term impacts of cultural tourism on local communities and cultural heritage. The application of frameworks like Cultural Impact Assessment (CIA) will help evaluate the cultural, social, and environmental effects of tourism initiatives. Research should also explore how traditional arts can be developed in ways that minimize the risks of commercialization while maximizing their cultural and economic value.

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UNEQUAL BEGINNINGS, UNEQUAL FUTURES: INCOME DISPARITIES AND EDUCATIONAL PROGRESSION IN VIETNAM

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ABSTRACT

Using the Vietnam Household Living Standard Survey (VHLSS) datasets in 2008 and 2018, this study examines how household income and educational spending influenced educational attainment in Vietnam. We find that while income had little impact in 2008, it became a key factor for achieving higher education by 2018, suggesting growing inequalities in educational access. In contrast, direct educational expenditure consistently and strongly predicted higher attainment across all levels in both periods. These findings highlight the need for policies like targeted financial aid to address income-based disparities and sustained investment in education to promote overall advancement.

Keywords: Vietnam, household income, educational level, educational expenditure.

1. INTRODUCTION

Ensuring equal and inclusive access to education for all individuals is one of the key goals among the 17 Sustainable Development Goals (SDGs) proposed by the United Nations (Sachs et al., 2022). To achieve this goal, income generally plays a crucial part. As such, the relationship between income and educational attainment has consistently attracted academic scholars globally. In the Vietnamese context, after the "Doi Moi" economic reform in 1986, the country transformed from one of the poorest in the world to a lower-middle-income country (Turley and Selden, 2019). Before and after "Doi Moi", numerous policies have been employed with efforts to generalize and develop the then-fragmented education system. One key change was that the Vietnamese government changed the official length of the formal education system in all regions to 12 years. (Tran-Nam, 2003)

Together with the growing body of literature on this topic in the global context, numerous studies attempt to examine this relationship from a Vietnamese perspective. One notable recent study by Tran et al. (2023) highlights that education not only improves livelihood outcomes and reduces poverty but also contributes to rising income inequality, as returns to education are significantly higher for wealthier households. On the other hand, as will be shown in the literature review later, to the best of our knowledge, there are few studies that directly investigate the effects of household income on a child's educational attainment at the individual level in Vietnam, since most studies focus on the reversed relationship of educational attainment on income. This study contributes to existing literature through two main points: First, it provides a perspective on how households' income and educational expenditures affect the attainment of educational levels at each proposed threshold. Second, by employing two separate regressions from two different Vietnam Household Living Standard Survey (VHLSS) datasets in 2008 and 2018, we can capture different insights into this relationship after 10 years of Vietnam's economic development.

The structure of this paper will be as follows: The first part introduces the relevance of the research topic in the Vietnamese context. The second part reviews some existing key literature about the relationship between income and educational attainment. The third part describes the datasets utilized in the analysis, followed by the econometrics methodology in Part 4. Part 5 presents the empirical results after the analysis. Part 6 concludes this paper by providing conclusions and suggesting relevant policy implications related to the analysis results.

2. LITERATURE REVIEW

This part starts with some key literature of the relationship between income and educational attainment across the world. The concept of investigating the effect was partly motivated by the research of Blanden and Gregg (2004). Using datasets from British Cohort Study and British Household Panel Survey, they find that family income has a significant and growing influence on educational attainment, with evidence suggesting a causal effect that contributes to persistent educational inequality in the context of rising income disparities. Beside presenting their empirical results, they also review approaches that have already been taken in past literature, mostly from US studies. Another perspective from Sari and Soytas (2006) yield a slight nuance view from Turkey. In their study, two datasets from World Development Indicators and Ministry of Finance data from 1937 – 1996 has been employed. Their results suggest that income, representing GDP, and education are cointegrated, with varying directions of causality across education levels, suggesting that school enrollments at certain stages play a meaningful role in shaping economic growth in the long run. Chevalier et al. (2013), on the other hand, choose to address the possible causal effect of parental education on children's outcomes, measured by their participation in post-compulsory schooling decisions. Considering both paternal income and education, they find that paternal education, especially for daughters, has a strong causal impact, while income effects are less robust.

In Vietnam context, there is a growing body of literature that interested in examining the effects of income and education. However, different from studies from global context above, literature that directly examines the effects of parental income on educational attainment of their children in Vietnam are limited. Most studies in Vietnam are interested in examining the effects of income on educational outcomes, since educational level is a common control variable in household and individual datasets. However, this effect side is reversed from the relationship that we are interested in this research. One empirical research from Dormeier and Giang (2012), using qualitative data from Hung An commune, Vietnam, reveal that despite the rise of individualistic values, family continues to shape their educational choices. Vocational education reflects both student ability and family aspirations, especially where cultural and social capital are limited. As living conditions improve, income becomes less decisive, and immaterial resources play a greater role. Moreover, vocational education students tend to act more autonomously, relying on peers and teachers, while higher education students remain under stronger parental influence. From another empirical perspective, utilizing the Viet Nam Household Living Standard Survey (VHLSS) dataset in 2016, a notable approach from Tran et al (2020) indicates that education contributes positively to better livelihood choices, higher household income, and poverty reduction, even after controlling for other covariates. However, results from their quantile regression reveal substantial heterogeneity in the returns to education across the income distribution, with significantly higher returns observed among wealthy households. Notably, some studies attempt to try a different approach to measure the educational quality. Instead of directly using educational levels to perform the analysis, some scholars take student's performance in exams to represent individuals' educational quality. From this approach, Tang and Tran (2023) find that parental involvement and expectations both improve students' math performance, self-esteem and attitude. Another paper from Van and Tran (2024) shows that as local economies grow, students tend to do better in school. This happens partly because schools get better buildings and fewer students per teacher, and the effect is stronger in places that are still poor but have good local leadership. Their results suggest that in some areas, economic growth can help improve education, even before making big investments in the school system.

In summary, empirical literature specifically investigating the direct influence of parental income on children's educational attainment in Vietnam remains limited. Hence, this study attempts to contribute to the literature by providing empirical evidence on this crucial topic.

3. DATA

In this study, data from the 2008 and 2018 waves of the Vietnam Household Living Standard Survey (VHLSS) will

be employed to investigate the relationship between household income and children's educational attainment. While the dependent variable is measured at the individual level, specifically the educational attainment of individuals identified as "son/daughter" within their respective households, other control variables are captured at the household and household head levels. Descriptive statistics for these two VHLSS datasets are presented in Table 1.

Table 1: The descriptive statistics of VHLSS datasets in 2008 and 2018

	2008				2018			
Variable	Obs	Mean	SD	Min–Max	Obs	Mean	SD	Min–Max
Educational Level (Base: All individuals)								
No education	12,145	0.00	0.07	0–1	49,048	0.24	0.43	0–1
Primary school	12,145	0.38	0.48	0–1	49,048	0.24	0.43	0–1
Secondary school	12,145	0.32	0.46	0–1	49,048	0.23	0.42	0–1
High/Intermed. school	12,145	0.26	0.44	0–1	49,048	0.20	0.40	0–1
College/University	12,145	0.04	0.20	0–1	49,048	0.09	0.29	0–1
Continuous Variables (Base: All households)								
log(Total Income)	9,493	9.90	1.48	3.00–15.82	45,690	11.87	0.72	7.69–16.34
Age	9,582	48.97	9.36	27–92	45,690	49.54	12.00	21–99
Household size	9,582	4.97	1.56	2–14	45,690	4.69	1.43	2–14
Education Expenditure	6,362	2,079.59	3,011.06	0–46,160	25,897	6,330.58	16,614.94	0–1,999,800
Binary Characteristics (Proportions) (Base: All households)								
Gender = Male	9,582	0.82	0.39	0–1	45,690	0.78	0.41	0–1
Gender = Female	9,582	0.18	0.39	0–1	45,690	0.22	0.41	0–1
Ethnic = "Kinh"	9,582	0.87	0.33	0–1	45,690	0.82	0.39	0–1
Ethnic = "Others"	9,582	0.13	0.33	0–1	45,690	0.18	0.39	0–1
Married	9,582	0.89	0.31	0–1	45,690	0.86	0.35	0–1
Not married	9,582	0.11	0.31	0–1	45,690	0.14	0.35	0–1
Employed	9,582	0.90	0.30	0–1	45,690	0.88	0.33	0–1
Not employed	9,582	0.10	0.30	0–1	45,690	0.12	0.33	0–1
Rural	9,582	0.70	0.46	0–1	45,690	0.69	0.46	0–1
Urban	9,582	0.30	0.46	0–1	45,690	0.31	0.46	0–1

Source: Authors' calculations using VHLSS 2008 and 2018 datasets.

4. METHODOLOGY

As educational attainment is an ordered categorical variable, Ordinary Least Squares (OLS) estimation is unsuitable due to its potential to produce biased, inconsistent, and inefficient results (Greene, 2003). To capture the effects of Vietnamese households' income and educational expenditures on the educational attainment of individuals identified as "son" or "daughter" within households, this study employs a Generalized Ordered Logit Model (GOLM). This model accommodates potential violations of the proportional odds (or parallel lines) assumption, which is often present in standard Ordered Logit models (OLM) (William, 2006, 2016).

Let $y_i \in \{1,2,3,4,5\}$ denote the categorical educational level of individual i, where the categories correspond to:

1: No education.

2: Primary school.

3: Secondary school.

4: High school/Intermediate school.

5: College/University.

The Generalized Ordered Logit Model estimates the log-odds of being at or above each educational threshold j (for $j_i \in \{1,2,3,4\}$ in this case) as follows:

$$\log\left[\frac{P(Y_i > j)}{1 - P(Y_i > j)}\right] = \log\left[\frac{P(Y_i > j)}{P(Y_i \leq j)}\right] = \alpha_j + \beta_j' X_i$$

Where:

α_j are the intercept (cut point) parameters.

x_i denotes the vector of observed covariates for individual i as presented in Table 1.

β_j denotes the threshold-specific coefficient vectors.

The GOLM allows covariates to have different effects at different thresholds, which relaxes the parallel regression assumption of the standard OLM:

$$\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4$$

Given that observations of sons and daughters within the same household may share unobserved household-specific characteristics, in this study, all standard errors are clustered at the household level to adjust for intra-household correlation. Models are estimated separately for the 2008 and 2018 waves of the Viet Nam Household Living Standard Survey (VHLSS). Furthermore, each year's model is run both with and without the educational expenditure variable, due to its varying data availability across the datasets.

5. EMPIRICAL RESULTS

5.1. Regression results

Table 2 presents the estimated log-odds ratios from Generalized Ordered Logit Models (GOLM) of educational attainment for 2008 and 2018, using cumulative contrasts. In the baseline specification, which excludes household-level educational expenditure, the key variable of interest, log of total household income, shows a negligible and statistically insignificant relationship with the probability of attaining higher levels of education in 2008. For instance, across the "No education vs higher levels" contrast (column 1), the log-odds ratio for log of total income is 0.0638, which is relatively small and not statistically significant.

However, by 2018, income becomes a strong and significant predictor of educational outcomes. Specifically, in the "No education vs higher levels" contrast (column 2), the log-odds ratio for log of total income is 0.382 ($p < 0.001$), indicating that higher-income households are more likely to attain higher levels of education. This positive and significant relationship strengthens for "Primary school vs higher levels" (column 4, coefficient = 0.587, $p < 0.001$) and "Secondary school vs higher levels" (column 6, coefficient = 0.792, $p < 0.001$). This shift reflects an increasingly stratified educational attainment landscape shaped by household income over time.

When household-level educational expenditure is added to the model, as shown in columns (9) through (16) in Table 3, the previously positive income effects in 2018 become negative and remain statistically significant. This inversion suggests that once direct education spending is accounted for, income no longer proxies access to education in the same way - possibly reflecting deeper exclusionary dynamics. For example, in the "No education vs higher levels" contrast (column 10), the log-odds ratio for log of total income is -0.385 ($p < 0.001$), consistent with this reversed effect. At the same time, as expected, the coefficient of log educational expenditure is consistently positive, large in magnitude, and highly statistically significant across all thresholds and both years. For instance, for "No education vs higher levels" in 2008 (column 9), the coefficient is 1.529 ($p < 0.001$), and in 2018 (column 10), it is 1.197 ($p < 0.001$). This variable appears to capture a distinct and powerful channel through which household resources translate into educational advancement, particularly in 2018 where the effects are stronger and more stable. The inclusion of educational spending changes the interpretation of the income effect and reveals a pattern whereby targeted investment, rather than income alone, plays a direct and meaningful role in promoting progression to higher levels of schooling.

The remaining control variables behave largely as expected. Age is positively associated with educational attainment in both years, suggesting higher cumulative attainment for older household heads. The gender gap, initially insignificant in 2008, reverses by 2018, implies that individuals living with male household heads significantly less likely to achieve higher educational levels. Urban residence and ethnicity ("Kinh" versus others) also show significant effects, particularly in 2018, indicating persistent spatial and ethnic disparities. On the other hand, marital and employment status of household heads as well as household size exhibit weaker and less consistent associations.

Table 2: Regression results from Generalized Ordered Logit Models (Excluding educational expenditures)

	[No education vs higher levels]		[Primary school vs higher levels]		[Secondary school vs higher levels]		[High school vs College/Uni]	
	(1) 2008	(2) 2018	(3) 2008	(4) 2018	(5) 2008	(6) 2018	(7) 2008	(8) 2018
log(Total income)	0.0638	0.382***	0.0998***	0.587***	0.126***	0.792***	0.0352	1.206***
	(0.48)	(17.20)	(5.78)	(28.64)	(6.60)	(33.97)	(0.81)	(32.98)
Age	0.0978***	0.121***	0.0734***	0.0924***	0.0732***	0.0799***	0.0942***	0.0798***
	(3.79)	(59.45)	(18.95)	(58.56)	(20.15)	(51.50)	(14.30)	(35.86)
Gender (Male = 1)	-0.281	-0.303***	-0.414***	-0.284***	-0.375***	-0.309***	-0.647***	-0.359***
	(-0.33)	(-7.89)	(-4.77)	(-8.02)	(-4.54)	(-8.33)	(-4.30)	(-6.61)
Ethnicity ("Kinh" = 1)	-0.112	-0.335***	0.0280	-0.289***	0.204*	-0.184***	0.596	-0.195**
	(-0.25)	(-8.94)	(0.36)	(-7.97)	(2.22)	(-4.33)	(1.89)	(-2.76)
Marriage Status ("Married" = 1)	-0.402	0.253***	0.495***	0.413***	0.410***	0.527***	0.145	0.463***
	(-0.29)	(4.25)	(4.13)	(8.35)	(3.42)	(10.45)	(0.80)	(6.66)
Employment ("Employed" = 1)	1.165	0.946***	0.233	0.726***	0.222*	0.429***	-0.121	0.0556
	(1.88)	(13.43)	(1.96)	(14.09)	(2.11)	(9.03)	(-0.72)	(0.94)
Location ("Urban" = 1)	0.727	-0.156***	0.0780	-0.0208	0.398***	0.244***	1.118***	0.365***
	(1.23)	(-5.30)	(1.34)	(-0.78)	(6.82)	(8.62)	(8.36)	(8.46)
Household Size	-0.133	-0.0856***	-0.126***	-0.104***	-0.119***	-0.132***	-0.0161	-0.136***
	(-1.17)	(-7.55)	(-7.16)	(-10.64)	(-5.25)	(-12.91)	(-0.50)	(-9.11)
Constant	0.891	-8.993***	-3.529***	-11.40***	-5.492***	-14.25***	-8.874***	-20.62***
	(0.45)	(-35.72)	(-11.65)	(-48.48)	(-17.67)	(-52.36)	(-12.63)	(-45.86)
N	9493	45690	9493	45690	9493	45690	9493	45690

Notes: Table 2 presents estimated log-odds ratios from generalized ordered logit models of educational attainment. The models are estimated separately for 2008 and 2018. Standard errors, clustered at the household level to adjust for intra-household correlation, are reported in parentheses. The "" symbols denote significance levels at 5%, 1 % and 0.1% (*** p < 0.001, ** p < 0.01, * p < 0.05) respectively.*

Table 3: Regression results from Generalized Ordered Logit Models (Including educational expenditures)

	[No education vs higher levels]		[Primary school vs higher levels]		[Secondary school vs higher levels]		[High school vs College/Uni]	
	(9) 2008	(10) 2018	(11) 2008	(12) 2018	(13) 2008	(14) 2018	(15) 2008	(16) 2018
log(Total income)	-0.147	-0.385***	-0.0169	-0.377***	-0.0347	-0.404***	-0.188**	0.0482
	(-0.66)	(-11.61)	(-0.69)	(-10.75)	(-1.16)	(-8.87)	(-2.65)	(0.38)
Age	0.127***	0.135***	0.105***	0.128***	0.110***	0.123***	0.103***	0.119***
	(3.40)	(45.14)	(16.92)	(40.38)	(15.54)	(28.52)	(6.65)	(11.16)
Gender (Male = 1)	0.403	-0.232***	-0.113	-0.231***	-0.146	-0.225**	-1.109***	-0.267
	(0.55)	(-4.56)	(-0.94)	(-4.04)	(-1.16)	(-3.08)	(-3.36)	(-1.26)
Ethnicity ("Kinh" = 1)	-1.106	-1.098***	-1.174***	-1.087***	-0.898***	-0.958***	0.261	-0.506
	(-1.78)	(-20.52)	(-9.88)	(-18.19)	(-5.50)	(-9.91)	(0.36)	(-1.78)
Marriage Status ("Married" = 1)	-14.18***	-0.146	-0.365	0.0710	-0.467*	-0.0757	0.304	-0.665*
	(-13.89)	(-1.69)	(-1.89)	(0.80)	(-2.25)	(-0.68)	(0.61)	(-2.38)
Employment ("Employed" = 1)	-12.43***	0.231	0.125	0.195	0.0685	0.258	0.473	-0.671**
	(-25.05)	(1.72)	(0.52)	(1.59)	(0.31)	(1.85)	(1.01)	(-2.69)
Location ("Urban" = 1)	0.363	-0.740***	-0.781***	-0.835***	-0.465***	-0.656***	0.311	-0.168
	(0.50)	(-17.77)	(-8.53)	(-18.01)	(-4.70)	(-11.59)	(1.14)	(-1.00)
Household Size	-0.0805	0.00639	0.00988	0.0278	0.0370	0.0487*	0.125	0.211***
	(-0.73)	(0.40)	(0.33)	(1.57)	(0.98)	(2.11)	(1.45)	(3.43)
log(Educational expenditure)	1.529***	1.197***	1.714***	1.557***	2.033***	2.146***	1.079***	1.564***
	(4.38)	(49.64)	(26.13)	(60.79)	(28.91)	(61.41)	(9.73)	(41.61)
Constant	19.35***	-8.809***	-14.40***	-13.61***	-19.38***	-20.46***	-16.79***	-24.25***
	(8.27)	(-23.66)	(-23.56)	(-34.51)	(-27.92)	(-38.62)	(-11.37)	(-14.78)
N	5498	24313	5498	24313	5498	24313	5498	24313

Notes: Table 3 presents estimated log-odds ratios from generalized ordered logit models of educational attainment, including household-level educational expenditure. The models are estimated separately for 2008 and 2018. Standard errors, clustered at the household level to adjust for intra-household correlation, are reported in parentheses. The "" symbols denote significance levels at 5%, 1 % and 0.1% (*** p < 0.001, ** p < 0.01, * p < 0.05) respectively.*

5.2. Average Marginal Effects (AMEs) results

To better capture the magnitude of these effects, the Average Marginal Effects (AMEs) of household income and educational expenditure on educational level are also presented in Figure 1 below. The AMEs are calculated for both 2008 and 2018, allowing us to observe changes in the relationship between these factors and educational outcomes over time.

The graphs in Figure 1 reveal several key findings. First, the effect of household income on educational attainment, shown in the top two panels, exhibits a notable shift between 2008 and 2018. In 2008 (The chart on the top left), the AMEs of income are generally small and statistically insignificant for all educational levels. The confidence intervals, represented by the horizontal bars, all cross the zero line. This suggests that, in 2008, household income had limited predictive power for the probability of attaining any specific level of education.

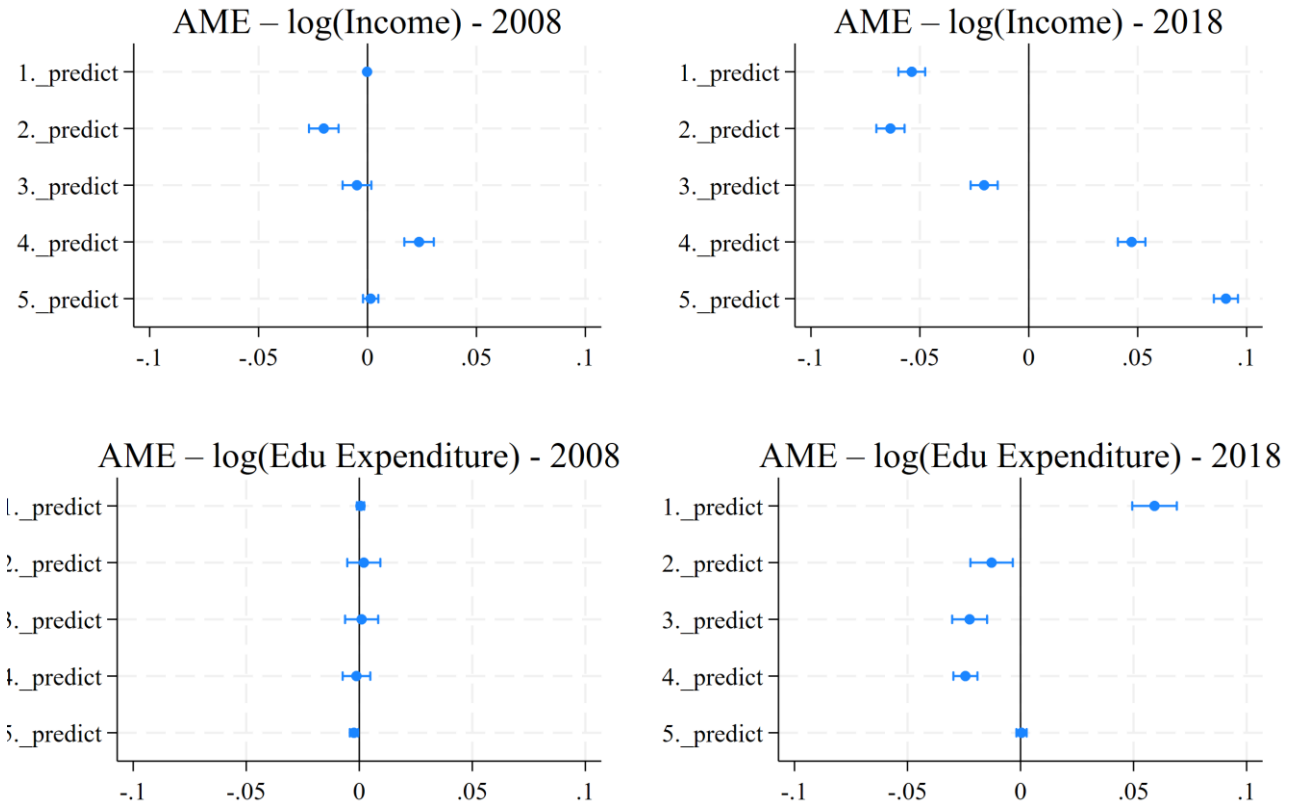
The bottom two graphs of Figure 1 display the AMEs of household educational expenditure. In both 2008 and 2018, the effects of educational expenditure are generally positive and statistically significant across most educational levels. The confidence intervals for these effects are located to the right of zero. This finding underscores the consistent

importance of direct educational spending in promoting educational attainment. Specifically, increased expenditure is associated with a higher likelihood of achieving each educational level, from Primary to College/University.

Comparing the effects of income and educational expenditure in 2008, it is evident that educational expenditure plays a more consistent and statistically robust role in determining educational attainment in both time periods. While income's influence on higher education appears to strengthen over time, direct expenditure remains a significant predictor across all levels.

However, the picture changes in 2018 (The chart on the top right). While the effects on the lower educational categories (Primary, Secondary, and High school) remain negative and statistically significant, we acknowledge that income reduces the probability of being in lower categories and increases the probability of being in higher ones. The confidence intervals for higher education levels lie entirely to the right of zero, while those for lower categories lie to the left, indicating a redistribution of probability mass toward higher attainment as income increases. The magnitude of this effect, while modest, suggests an emerging role of income in driving access to higher education.

Figure 1: the AMEs of household income and educational expenditure on educational level



Notes: Figure 1 presents the AMEs of log(total income) and log(educational expenditure) on the probability of attaining each educational level. The AMEs are derived from the GOLM presented in Tables 2 and 3. The points represent the estimated AMEs, and the horizontal bars represent the 95% confidence intervals, calculated using standard errors clustered at the household level. AMEs are shown for both 2008 and 2018, and across five educational attainment categories, labeled "1._predict" (Primary Education) through "5._predict" (College/University). Statistical significance is indicated when the 95% confidence interval does not cross the vertical line at zero.

5.3. Post-test estimations

To confirm the reliability of our regression results, we performed several diagnostic tests, as shown in Table 4 below.

An initial examination of the correlation matrix in Table 4 reveals the pairwise relationships between our explanatory variables. Most correlations are moderate, indicating that while variables are related, they generally do not exhibit excessively high linear dependencies that would cause severe multicollinearity issues. For instance, log(Total income) shows a positive correlation with log(Educational expenditure) (0.1935 in 2008 and 0.4425 in 2018), which is expected given their economic nature, but these levels are not alarmingly high.

We further checked for multicollinearity using the Variance Inflation Factor (VIF). All VIF values were well below the common threshold of 10, with the highest being 1.68. This indicates that our variables are not overly correlated, allowing us to reliably estimate their individual effects.

We also tested for heteroskedasticity using the Breusch-Pagan test. The test results strongly and statistically indicated that heteroskedasticity was present in both 2008 (chi-squared = 15.14, p-value = 0.0001) and 2018 (chi-squared = 267.80, p-value = 0.0000). To address this, all our regressions used robust standard errors that are clustered at the household level. This approach ensures that our statistical findings remain valid and reliable despite the varying spread of the error terms.

In summary, our models are not affected by problematic multicollinearity, and the use of robust standard errors ensures the validity of our findings given the detected heteroskedasticity.

Table 4: Correlation Matrix, VIF, and Breusch-Pagan Test Results

	Correlation matrix (pwcorr)									VIF
Variable	log(Total income)	Age	Gender	Ethnicity	Marriage Status	Employment	Location	Household Size	log(Education expenditure)	
Panel A: 2008										
log(Total income)	1.0000	0.0733*	−0.0368*	0.1057*	0.0195	−0.0672*	0.1554*	0.0778*	0.1935*	1.06
Age	0.0733*	1.0000	−0.0777*	0.1119*	−0.2294*	−0.4425*	0.1496*	0.0995*	0.3731*	1.23
Gender	−0.0368*	−0.0777*	1.0000	−0.1052*	0.5565*	0.1542*	−0.2285*	0.1775*	−0.1415*	1.41
Ethnicity	0.1057*	0.1119*	−0.1052*	1.0000	−0.0463*	−0.0716*	0.1486*	−0.1343*	0.3332*	1.15
Marriage Status	0.0195	−0.2294*	0.5565*	−0.0463*	1.0000	0.1973*	−0.0822*	0.1431*	−0.0314*	1.34
Employment	−0.0672*	−0.4425*	0.1542*	−0.0716*	0.1973*	1.0000	−0.2357*	−0.0425*	−0.1162*	1.07
Location	0.1554*	0.1496*	−0.2285*	0.1486*	−0.0822*	−0.2357*	1.0000	−0.0509*	0.2798*	1.16
Household Size	0.0778*	0.0995*	0.1775*	−0.1343*	0.1431*	−0.0425*	−0.0509*	1.0000	−0.1731*	1.13
log(Education expenditure)	0.1935*	0.3731*	−0.1415*	0.3332*	−0.0314*	−0.1162*	0.2798*	−0.1731*	1.0000	1.43
Breusch-Pagan test for heteroskedasticity: $\chi^2(1) = 15.14, \quad p\text{-value} = 0.0001$										
Panel B: 2018										
logTI	1.0000	0.1904*	−0.0250*	0.4189*	0.0865*	−0.0883*	0.3318*	0.2292*	0.4425*	1.60
Age	0.1904*	1.0000	−0.1702*	0.1830*	−0.3282*	−0.5157*	0.1444*	0.1478*	0.4511*	1.31
Gender	−0.0250*	−0.1702*	1.0000	−0.0931*	0.5991*	0.2284*	−0.1683*	0.1432*	−0.0819*	1.30
Ethnic	0.4189*	0.1830*	−0.0931*	1.0000	−0.0588*	−0.0908*	0.1963*	−0.1139*	0.4336*	1.42
Marriage	0.0865*	−0.3282*	0.5991*	−0.0588*	1.0000	0.2766*	−0.0640*	0.1778*	−0.0201*	1.34
Employed	−0.0883*	−0.5157*	0.2284*	−0.0908*	0.2766*	1.0000	−0.1879*	−0.0790*	−0.0763*	1.04
Urban	0.3318*	0.1444*	−0.1683*	0.1963*	−0.0640*	−0.1879*	1.0000	−0.0328*	0.3021*	1.22
HHSize	0.2292*	0.1478*	0.1432*	−0.1139*	0.1778*	−0.0790*	−0.0328*	1.0000	−0.1663*	1.17
logEduExp	0.4425*	0.4511*	−0.0819*	0.4336*	−0.0201*	−0.0763*	0.3021*	−0.1663*	1.0000	1.68
Breusch-Pagan test for heteroskedasticity: $\chi^2(1) = 267.80, \quad p\text{-value} = 0.0000$										

*Notes: Correlation coefficients with * indicate significance at the 5% level. VIF denotes Variance Inflation Factor. Breusch-Pagan test checks for heteroskedasticity in regressions of educational level on covariates.*

6. CONCLUSION

This study examined the factors influencing educational attainment in 2008 and 2018 using two waves of Vietnam Household Living Standard Survey (VHLSS) individual and household datasets. We found that household income, initially less impactful, became a significant predictor of higher educational attainment, especially in 2018. This suggests a growing divide in educational opportunities based on income, potentially making it harder for those with less financial resources to access higher education. In contrast, direct household educational expenditure consistently and strongly predicted higher attainment across all levels in both periods, highlighting its distinct and powerful role in fostering educational advancement, irrespective of broader income changes.

These findings underscore two key policy implications. First, addressing income-related disparities in higher education access is crucial, perhaps through expanding targeted financial aid programs and scholarships to ensure that financial background does not disproportionately limit educational opportunities. Second, strengthening broad educational advancement requires sustained investment in educational spending. This could involve direct subsidies for educational materials or programs, or public funding to enhance educational quality, leveraging the potent impact of direct expenditure.

A key limitation of this study is its reliance on repeated cross-sectional data, which prevents us from establishing dynamic or truly causal relationships between household characteristics and educational trajectories over time. Future research leveraging individual or household panel data could more robustly explore these dynamic and causal effects, offering deeper insights into the mechanisms driving educational attainment and informing more precisely targeted policy interventions.

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A QUANTITATIVE INVESTIGATION OF THE IMPACT OF LAPTOP USE ON ACADEMIC PERFORMANCE OF THIRD-YEAR STUDENTS AT UEF IN DIGITAL ERA

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ABSTRACT

In the wake of the COVID-19–driven expansion of online and blended learning, third-year students at Ho Chi Minh City University of Economics and Finance (UEF) increasingly rely on personal laptops for academic work. While this trend promises greater access to resources and collaborative potential, it also raises concerns about off-task browsing, concentration lapses, and ergonomic strain. This study quantitatively examines how six dimensions of laptop use - Attitude towards Technology, Flexibility in Time and Location, Active Learning, Computer Skills, Connectivity, and Information-Use Capability - predict academic performance among 250 third-year UEF students. Data were gathered via a structured survey and analyzed using SPSS, employing exploratory factor analysis and multiple regression. Results reveal that the model explains 75.4% of the variance in grade point average. Computer Skills (β = .501), Flexibility in Time and Location (β = .462), and Information-Use Capability (β = .431) emerged as the strongest positive predictors, followed by Attitude towards Technology (β = .307), Active Learning (β = .204), and Connectivity (β = .173). These findings underscore the critical role of technical proficiencies and adaptable access in fostering academic success. We recommend targeted digital-literacy workshops, expanded cloud-based learning platforms, and initiatives to cultivate constructive technology mindsets. This research informs institutional strategies for optimizing laptop integration in higher education.

Keywords: Academic Performance; Digital Era; Higher Education; Laptop; UEF Students

1. INTRODUCTION

In recent years, laptop ownership among Vietnamese undergraduates has surged, with over 95% of students reporting regular use of personal laptops for academic purposes (Lauricella & Kay, 2010). Concurrently, the COVID-19 pandemic precipitated an unprecedented shift toward online and blended learning modalities, compelling institutions such as Ho Chi Minh City University of Economics and Finance (UEF) to integrate digital tools into curricula and administrative processes (Law et al., 2018; Nguyễn Phước Hiển, 2024).

While laptops enable immediate access to rich educational resources and facilitate collaborative projects, they also introduce potential drawbacks, including off-task internet browsing, impaired concentration, and ergonomic concerns (Henderson et al., 2017; Reisdorf et al., 2020). Empirical studies in domestic contexts have demonstrated that unstructured laptop use during lectures correlates negatively with learning outcomes (Đặng Thu Hương et al., 2022) and that alternative note-taking strategies can enhance conceptual understanding (Đinh Thị Hóa et al., 2018).

However, despite growing laptop dependence among Vietnamese students, there is a conspicuous lack of quantitative research examining how laptop usage patterns specifically influence academic performance at UEF (Nguyễn Thùy Dung & Hoàng Thị Kim Oanh, 2017).

Addressing this gap, the present study aims to quantify the impact of laptop use on the grade point averages of third-year UEF students. The primary objectives are to (1) identify key usage behaviors that correlate with academic achievement, (2) assess the magnitude of their effects through regression analysis, and (3) propose evidence-based recommendations for optimizing laptop integration in UEF's learning environment.

By elucidating the nuanced relationship between digital tool utilization and student outcomes, this research contributes both to the international discourse on educational technology and to UEF's strategic planning for digital learning support. The remainder of the paper reviews relevant literature and theoretical frameworks, outlines the quantitative methodology, presents empirical findings, discusses implications and limitations, and concludes with

practical recommendations and future research directions.

2. LITERATURE REVIEW

2.1. Theoretical basis

Academic performance is typically operationalized as cumulative GPA, reflecting students' mastery of university-level knowledge and skills (Nguyễn Thùy Dung & Hoàng Thị Kim Oanh, 2017), with self-evaluated gains in subject-specific competencies serving as a complementary outcome measure (Đinh Thị Hóa et al., 2018). Laptop use in higher education encompasses the frequency, duration, and purposes - such as note-taking, resource access, collaboration, or entertainment - for which students employ portable computers (Lauricella & Kay, 2010).

The Technology Acceptance Model (TAM) argues that perceived usefulness (PU) and perceived ease of use (PEOU) are the primary determinants of technology adoption intentions (Davis, 1986). Self-Determination Theory (SDT) posits that autonomy, competence, and relatedness drive intrinsic motivation and engagement with digital tools in educational contexts (Deci & Ryan, 1980). (Law et al., 2018) further identifies six interrelated digital literacy competencies - accessing, managing, understanding, integrating, communicating, and creating information - while Gilster (1997) emphasize critical thinking and socio-emotional awareness as essential dimensions.

By integrating TAM, SDT, and digital literacy frameworks, a comprehensive model suggests that PU and PEOU shape students' acceptance and use of laptops, autonomy/competence/relatedness support their intrinsic motivation, and higher digital literacy enables effective navigation, evaluation, and production of digital content - together maximizing academic benefits (Davis, 1986; Deci & Ryan, 1980; Gilster, 1997). Yet empirical research on how these combined factors influence GPA outcomes among Vietnamese third-year undergraduates (Đinh Thị Hóa et al., 2018; Nguyễn Thùy Dung & Hoàng Thị Kim Oanh, 2017) - particularly at the University of Economics and Finance - remains scarce.

2.2. Literature review

Domestic studies in Vietnam have examined multiple dimensions influencing learning quality and academic outcomes. Đặng Thu Hương et al. in 2022 proposed a T-H-I-O framework to assess online learning among undergraduates in Hanoi, finding that Technology, Human, Information, and Organization factors each significantly affect perceived learning quality - with technical infrastructure exerting the strongest influence. Nguyễn Thị Thu An et al., 2016 distinguished student-centric variables (knowledge, motivation, proactivity) from instructor competencies (course design, interaction, preparation), showing that student factors explain more GPA variance and recommending enhanced pedagogical skills alongside student-led preparation and group work. Focusing on IT students, Đặng Thu Hương et al., 2022 identified seven predictors of grades - learning interest, facility adequacy, social and peer pressure, intellectual ability, scholarships, and parental motivation - with interest emerging as paramount. Complementing these quantitative insights, (Đặng Thị Dung, 2023) demonstrated that cooperative learning techniques in a database course bolster intrinsic motivation, communication skills, and achievement. More recently, Nguyễn Phước Hiển in 2024 highlighted the digital transformation challenges in tourism education - insufficient infrastructure, low ICT proficiency, cultural resistance - and pointed to opportunities in VR, AI, and online platforms for enhancing flexibility and expanding access.

International research similarly underscores the centrality of digital tools and learner motivation. Henderson et al. in 2017 showed that beyond providing devices, institutions must sustain both logistical and pedagogical support to realize the benefits of technology in higher education. In distance education contexts, (Castillo-Merino & Serradell-López, 2014) identified intrinsic motivation - driven by self-efficacy, age, and seniority - as the primary predictor of exam success. (Reisdorf et al., 2020) countered concerns over device distractions by showing that purposeful instructor-led integration of laptops, tablets, and smartphones significantly raises students' perceived necessity of these tools. Finally, (Khalifeh et al., 2020) demonstrated that in computer-supported collaborative learning, both interpersonal (conflict resolution, cohesion) and intrapersonal (self-regulation, autonomy) competencies jointly underpin positive learning trajectories.

Collectively, these domestic and international studies highlight that academic performance in higher education is shaped by a combination of technological readiness and digital tool integration, learner motivation, teaching practices, and institutional support. They also underscore the importance of both collaborative and individual digital competencies, suggesting that a holistic approach - addressing infrastructure, pedagogy, motivational constructs, and digital literacy - is essential for improving student outcomes.

2.3. Proposed hypotheses and research model

Based on literature review, Figure 2.1 presents a model in which six latent constructs are hypothesized to directly predict academic performance. The specific hypotheses are:

H1: A positive attitude towards technology will be associated with higher academic performance. Students who view laptops as valuable learning tools invest more effort in coursework and exhibit greater engagement (Henderson et al., 2017; Reisdorf et al., 2020).

H2: Flexibility in time and location afforded by laptop use will positively influence academic performance. The ability to study asynchronously and from varied environments supports self-paced learning and persistence (Nguyễn Phước Hiển, 2024).

H3: Active learning - characterized by problem-based tasks, simulations, and collaborative projects delivered via laptops - will enhance academic performance through heightened cognitive engagement and intrinsic motivation (Đặng Thị Dung, 2023; Khalifeh et al., 2020).

H4: Computer skills will positively predict academic performance. Proficiency in digital applications streamlines information retrieval, data analysis, and assignment completion, leading to higher grades(Đặng Thu Hương et al., 2022; Nguyễn Thị Thu An et al., 2016).

H5: Connectivity - the capacity to access synchronous and asynchronous networks and peer communities - will be positively related to academic performance by facilitating resource sharing and collaborative knowledge construction (Castillo-Merino & Serradell-López, 2014; Khalifeh et al., 2020).

H6: Information-use capability, defined as the ability to locate, evaluate, integrate, and apply digital information effectively, will positively influence academic performance through deeper comprehension and critical analysis (Henderson et al., 2017; Lauricella & Kay, 2010; Law et al., 2018).

Empirical testing of these hypotheses will clarify how TAM- and SDT-derived constructs, in concert with digital literacy dimensions, inform laptop use behaviors and predict GPA among third-year students at UEF in the post-pandemic era.

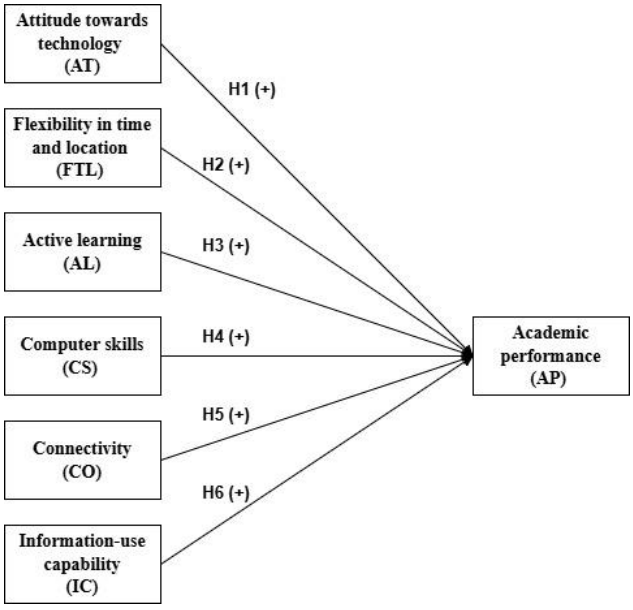


Figure 2.1. Proposed research model

(Source: Authors)

3. METHODOLOGY AND DATA

3.1. Data

This study employed a cross-sectional survey design to examine how laptop use relates to academic performance among third-year undergraduates at the University of Economics and Finance (UEF). The target population comprised

all third-year students (N = 4,000; age range: 18–30) across Economics, Finance, Business Administration, Marketing, and Information Technology. Using Yamane's (1967) formula with a 95 % confidence level and a 5 % margin of error, a minimum sample size of 364 was calculated. To allow for non-response and invalid cases, we oversampled by 20 %, distributing 437 questionnaires. After data cleaning - removing incomplete surveys and extreme outliers - the final analytic sample comprised 250 valid responses.

A stratified random sampling approach was adopted to enhance representativeness and reduce selection bias. The student body was divided into strata by faculty, and within each stratum participants were randomly invited via university email lists. This ensured proportional coverage of disciplinary differences in laptop use. While stratification improved internal representativeness, it required accurate faculty rosters and increased administrative coordination.

Data were collected through an online questionnaire administered over a four-week period in spring 2024. Except for demographic items (age, gender, major) and Perceived Usefulness and Perceived Ease of Use (yes or no); all constructs were measured on a five-point Likert scale (1=Strongly Disagree to 5=Strongly Agree).

3.2. Data analysis method

All statistical procedures were carried out in SPSS 25.0. First, descriptive statistics (means, standard deviations, frequencies) summarized participant characteristics and key variables. Data screening addressed missingness (cases with >20 % missing data were excluded), normality (skewness/kurtosis within ±2), and univariate outliers (standardized values > |3|).

Reliability of multi-item scales was assessed via Cronbach's alpha, with $\alpha \geq 0.70$ considered acceptable (Nunnally & Bernstein, 1994). Items with corrected item-total correlations below 0.30 were candidates for removal. Exploratory Factor Analysis (EFA) using principal axis factoring and Promax rotation examined construct dimensionality. Sampling adequacy was confirmed by a Kaiser-Meyer-Olkin measure ≥0.60 and Bartlett's test of sphericity ($p < .05$). Factors with eigenvalues >1.0 and communalities ≥0.50 were retained, accounting for over 50 % of total variance.

Bivariate relationships were explored using Pearson's correlation coefficients, interpreted following Cohen's (1988) benchmarks (small: |r|=.10–.29; medium: |r|=.30–.49; large: |r|≥.50). Multiple linear regression models then tested the predictive power of independent variables on academic performance. Model adequacy was evaluated by the adjusted R^2, and the Durbin-Watson statistic (target range 1.5–2.5) assessed residual autocorrelation. Multicollinearity diagnostics included Variance Inflation Factor (VIF<10) and Tolerance (>0.10). Statistical significance was set at $p < .05$ for all hypothesis tests.

Ethical clearance was obtained from the UEF Institutional Review Board. Participants provided informed consent electronically, and data were anonymized to protect confidentiality.

Despite a rigorous design, the study has limitations: the cross-sectional nature precludes causal inference and the relatively small final sample may limit generalizability beyond UEF. Future research should employ longitudinal designs and larger, multi-institution samples to validate and extend these findings.

4. RESEARCH RESULTS AND DISCUSSION

4.1. Summary of descriptive statistics

In this research, of 437 questionnaires distributed, 250 valid responses remained after cleaning, yielding a 57.2% usable response rate. The sample was 56.0% male and 44.0% female, with age groups evenly split: under 21 (32.4%), exactly 21 (33.6%), and over 21 (34.0%). Majors were Marketing (23.6%), Information Technology (21.2%), Business Administration (19.6%), Economics (19.2%), and Finance (16.4%). Regarding attitudes, 78.0% of students agreed that laptops enhance their learning efficiency (Perceived Usefulness) and 83.6% found them intuitive for academic tasks (Perceived Ease of Use). Marketing and IT students reported the highest acceptance, while Finance majors were least represented. These results highlight broad laptop endorsement with targeted support needed for the minority facing technical or digital-skill barriers.

Table 4.1. Descriptive statistics

Characteristics		Frequency	Percent (%)
Gender	Male	140	56.0
	Female	110	44.0
Age	< 21 years old	81	32.4
	21 years old	84	33.6
	> 21 years old	85	34.0
Major	Business Administration	49	19.6
	Economics	48	19.2
	Finance	41	16.4
	Marketing	59	23.6
	Information Technology	53	21.2
Perceived Usefulness	Yes	195	78.0
	No	55	22.0
Perceived Ease of Use	Yes	209	83.6
	No	41	16.4

(Source: Authors)

In this study, a survey was administered at UEF between January and March 2024 to examine third-year students' laptop use and its perceived impact on learning. Of 262 questionnaires distributed, 250 were valid (95.4% completion). Respondents were 56.0% male and 44.0% female, with ages distributed as under 21 years (32.4%), exactly 21 (33.6%), and over 21 (34.0%). Majors represented were Marketing (23.6%), Information Technology (21.2%), Business Administration (19.6%), Economics (19.2%), and Finance (16.4%).

Regarding key attitudes, 78.0% of students agreed that laptops enhance their learning efficiency (perceived usefulness), and 83.6% found them intuitive for academic tasks (perceived ease of use), leaving 22.0% and 16.4% respectively reporting barriers. These high endorsement rates align with the Technology Acceptance Model and reflect strong competence and autonomy per Self-Determination Theory, especially among Marketing and IT majors. Finance students showed the lowest uptake, suggesting curricular tools shape technology attitudes. To bridge gaps, tailored digital-literacy workshops and improved IT support are recommended. The next section will present inferential analyses linking these perceptions to cumulative GPA to quantify the academic benefits of laptop use.

4.2. Reliability of the scales

To ensure the internal consistency of our constructs, we calculated Cronbach's alpha coefficients for each latent variable, adopting the widely recognized criterion that α values of 0.70 or higher indicate satisfactory reliability (Nunnally & Bernstein, 1994). We also inspected corrected item–total correlations, retaining only those items surpassing the 0.30 threshold (Hair et al., 2010). Table 4.2 presents the outcomes for the seven scales employed in this study.

Table 4.2. Reliability of the measurement scales

Variable	Code	Corrected Item – Total Corelation	Cronbach's Alpha if Item Deleted	Source
Attitude towards technology (α = .808, n = 5)	**AT1**	.575	.777	(Shakeel et al., 2023)
	AT2	.571	.778	
	AT3	.618	.764	
	AT4	.615	.765	
	AT5	.592	.772	
Flexibility in time and location (α = .811, n = 5)	**FTL1**	.574	.782	(Shakeel et al., 2023)
	FTL2	.556	.788	
	FTL3	.618	.769	
	FTL4	.632	.765	
	FTL5	.614	.770	

Active learning (α = .766, n = 4)	**AL1**	.565	.712	(Khalifeh et al., 2020)
	AL2	.562	.713	
	AL3	.572	.708	
	AL4	.566	.711	
Computer skills (α = .730, n = 3)	**CS1**	.595	.710	(Shakeel et al., 2023)
	CS2	.598	.788	
	CS3	.570	.723	
Connectivity (α = .790, n = 4)	**CO1**	.591	.743	(Khalifeh et al., 2020)
	CO2	.568	.754	
	CO3	.582	.748	
	CO4	.657	.709	
Information-use capability (α = .705, n = 4)	**IC1**	.548	.604	(Yustika & Iswati, 2020)
	IC2	.485	.644	
	IC3	.436	.674	
	IC4	.492	.640	
Academic performance (α = .725, n = 3)	**AP1**	.453	.742	(Yustika & Iswati, 2020)
	AP2	.611	.758	
	AP3	.582	.792	

(Source: Authors)

The Attitude towards Technology scale yielded an alpha of 0.808 across five items, with item–total correlations ranging from 0.571 to 0.618. No individual deletion increased the overall reliability, confirming each item's contribution to the construct. Similarly, the Flexibility in Time and Location dimension demonstrated robust internal consistency (α = 0.811), with item–total correlations between 0.556 and 0.632, and a negligible impact of any single-item removal on the composite alpha.

The Active Learning construct four items, reporting an alpha of 0.766 and item–total correlations from 0.562 to 0.572. Computer Skills achieved α = 0.730, with correlations between 0.570 and 0.598, while the Connectivity scale recorded α = 0.790 and item correlations ranging from 0.568 to 0.657. The Information-Use Capability dimension presented the lowest, yet acceptable, reliability at α = 0.705, with item–total correlations spanning 0.436 to 0.548. Finally, Academic Performance delivered an alpha of 0.725 and correlations from 0.453 to 0.611.

All scales met or exceeded the 0.70 threshold, and no items exhibited problematic loadings or correlations that would warrant exclusion. These results affirm that our measurement instruments possess adequate reliability, providing a solid foundation for subsequent structural analyses.

4.3. Exploratory Factor Analysis Results

Before extracting latent dimensions, the suitability of the 23 items for factor analysis was assessed. The Kaiser-Meyer-Olkin measure of sampling adequacy yielded a value of 0.737, exceeding the commonly accepted cutoff of 0.60 (Table 4.3). Bartlett's Test of Sphericity was highly significant ($\chi^2(300) = 1782.275$, $p < 0.001$), confirming that correlations among items were sufficiently large for principal component analysis.

Using the Kaiser criterion (eigenvalues > 1), six components emerged from the initial extraction phase, together accounting for 57.46% of the total variance (see "Initial Eigenvalues" in Table 4.5). After varimax rotation with Kaiser normalization, these six factors explained 53.46% of variance (Table 4.5, "Rotation Sums of Squared Loadings"), and each factor displayed clear, interpretable groupings of items with loadings well above the 0.50 threshold (Table 4.3).

The rotated solution demonstrates both convergent validity (all loadings > 0.50) and discriminant validity (minimal cross-loading), yielding six coherent constructs that align closely with the Technology Acceptance Model, Self-Determination Theory, and the Digital Literacy Framework. These factors constitute a robust measurement basis for subsequent analyses examining how laptop usage influences academic performance among third-year students at UEF.

Table 4.5. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.614	26.103	26.103	8.614	26.103	26.103	3.431	10.398	10.398
2	2.611	7.912	34.016	2.611	7.912	34.016	3.421	10.366	20.764
3	2.414	7.314	41.329	2.414	7.314	41.329	2.789	8.453	29.216
4	2.045	6.196	47.525	2.045	6.196	47.525	2.752	8.341	37.557
5	1.830	5.545	53.070	1.830	5.545	53.070	2.643	8.008	45.566
6	1.449	4.390	57.461	1.449	4.390	57.461	2.604	7.892	53.457

(Source: Authors)

Table 4.3. Component Matrix

Observable Variable	Component					
	1	2	3	4	5	6
FTL4	.784					
FTL3	.764					
FTL5	.762					
FTL1	.735					
FTL2	.715					
AT3		.758				
AT4		.758				
AT5		.743				
AT1		.742				
AT2		.737				
CO4			.816			
CO3			.776			
CO1			.768			
CO2			.753			
AL3				.772		
AL4				.763		
AL1				.761		
AL2				.756		
IC1					.780	
IC2					.726	
IC4					.725	
IC3					.668	
CS2						.827
CS3						.814
CS1						.754

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

(Source: Authors)

Table 4.4. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.737
Barlett's test of Sphericity	**Approx. Chi Square**	1782.275
	df	300
	Sig.	0.000

(Source: Authors)

4.4. Research Model Fit Assessment

4.4.1. Correlation Analysis

The Pearson correlation analysis examined inter-item relationships and discriminant validity for six laptop-use dimensions. Within each construct, items correlated moderately to strongly (all $p < .001$): Attitude towards Technology (AT) ranged from $r = .405$ to .508; Flexibility in Time and Location (FTL) from $r = .376$ to .506; Active Learning (AL) from $r = .425$ to .471; Computer Skills (CS) up to $r = .551$; Connectivity (CO) from $r = .430$ to .525; and Information-Use Capability (IC) from $r = .285$ to .439. Cross-construct correlations were uniformly low ($|r| < .19$), with the highest between AT3–AL3 ($r = .146$, $p < .01$) and FTL3–AL3 ($r = .139$, $p < .01$), confirming discriminant validity.

All observed correlations fall well below the conservative threshold of $r = .70$ (Hair et al., 2010), eliminating concerns of multicollinearity among the predictors. The clear separation between within-construct and cross-construct correlations validates the measurement model's factorial structure and permits confidence in subsequent regression and structural equation analyses aimed at uncovering how these dimensions jointly influence academic performance in the digital era

Table 4.6. Summary table of Factor Loadings after rotation

Factor	Variable
Attitude towards technology (AT)	AT1, AT2, AT3, AT4, AT5
Flexibility in time and location (FTL)	FTL1, FTL2, FTL3, FTL4, FTL5
Active learning (AL)	AL1, AL2, AL3, AL4
Computer skills (CS)	CS1, CS2, CS3
Connectivity (CO)	CO1, CO2, CO3, CO4
Information-use capability (IC)	IC1, IC2, IC3, IC4

(Source: Authors)

4.4.2. Regression Analysis Results and Model Validation Test

A multiple linear regression was conducted in SPSS to determine how six dimensions of laptop use - Attitude towards Technology (AT), Flexibility in Time and Location (FTL), Active Learning (AL), Computer Skills (CS), Connectivity (CO), and Information-Use Capability (IC) - collectively predict Academic Performance (AP). The estimated regression equation is:

$$\mathbf{AP = 0.501 \times CS + 0.462 \times FTL + 0.431 \times IC + 0.307 \times AT + 0.204 \times AL + 0.173 \times CO + \epsilon}$$

Where: AP = Academic Performance; AT = Attitude towards technology; FTL = Flexibility in time and location; AL = Active learning; CS = Computer skills; CO = Connectivity; IC = Information-use capability.

Table 4.7 presents the model fit statistics: $R = 0.872$, $R^2 = 0.760$, and Adjusted $R^2 = 0.754$, indicating that approximately 75.4 percent of the variance in AP is explained by the six predictors. The standard error of the estimate is 0.366. A Durbin–Watson value of 2.015 lies well within the acceptable range of 1.5 to 2.5, suggesting no serious autocorrelation in the residuals.

Table 4.8 summarizes the ANOVA results, showing that the regression model is highly significant ($F(6, 243) = 128.330$, $p < 0.001$). This confirms that, as a whole, the set of independent variables reliably forecasts academic outcomes among third-year students at UEF.

Detailed coefficients appear in Table 4.9. All six predictors exhibit statistically significant positive effects on AP (p

< 0.001), and variance inflation factors (VIFs) range from 1.004 to 1.018, well below the conventional cutoff of 10, thereby ruling out multicollinearity concerns. Computer Skills exerts the strongest influence (standardized β = 0.501), indicating that a one-standard-deviation increase in CS is associated with a 0.501-standard-deviation rise in AP. Flexibility in Time and Location follows closely (β = 0.462), underscoring the importance of adaptable study conditions. Information-Use Capability (β = 0.431) and Attitude towards Technology (β = 0.307) also contribute substantially, highlighting the role of digital literacy and positive dispositions toward technology. Active Learning (β = 0.204) and Connectivity (β = 0.173), while exhibiting smaller effect sizes, remain significant predictors, suggesting that students' engagement in interactive, technology-mediated learning tasks and reliable internet access further bolster academic achievement.

Table 4.7. Model Fit Assessment Results

Model	R	R^2	Adjusted R^2	Std. Error	Durbin-Watson
1	.872[a]	.760	.754	.366	2.015
a. Predictors: (Constant) F_IC, F_CO, F_AT, F_CS, F_FTL, F_AL					
b. Dependent Variable: F_AP					

(Source: Authors)

Table 4.8. ANOVA Results

Model		Sum of squares	df	Mean Square	F	Sig
1	Regression	103.273	6	17.212	128.330	.000[b]
	Residual	32.592	243	.134		
	Total	112.454	249			
a. Predictors: (Constant): F_IC, F_CO, F_AT, F_CS, F_FTL, F_AL						
b. Dependent Variable: F_AP						

(Source: Authors)

Table 4.9. Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-3.836	.268		-14.324	.000		
	Attitude towards technology	.336	.035	.307	9.716	.000	.990	1.010
	Flexibility in time and location	.551	.038	.462	14.615	.000	.988	1.012
	Active learning	.230	.036	.204	6.441	.000	.983	1.018
	Computer skills	.506	.032	.501	15.890	.000	.994	1.006
	Connectivity	.194	.035	.173	5.477	.000	.985	1.016
	Information-use capability	.473	.035	.431	13.686	.000	.996	1.004

Dependent Variable: F_AP

(Source: Authors)

The analysis demonstrates that technical proficiencies and the capacity to leverage information resources are the most critical drivers of academic performance among third-year students in the digital era. Enhancing flexible access to learning materials and fostering constructive attitudes toward technology use can further amplify these gains, while continued

support for active learning strategies and stable connectivity will ensure a comprehensive framework for improving academic performance.

5. CONCLUSION AND MANAGERIAL IMPLICATIONS

5.1. Conclusion

This study demonstrates that laptop-use dimensions collectively account for 75.4 percent of the variance in third-year students' academic performance (Adjusted $R^2 = .754$). Among the six predictors, Computer Skills emerged as the most potent driver ($\beta = .501$), closely followed by Flexibility in Time and Location ($\beta = .462$), Information-Use Capability ($\beta = .431$), and Attitude towards Technology ($\beta = .307$). Active Learning ($\beta = .204$) and Connectivity ($\beta = .173$) also make meaningful contributions, confirming that both the technical proficiencies and the learning environments afforded by laptops play pivotal roles in supporting higher academic performance.

These findings underscore that universities aiming to bolster academic achievement must invest not only in hardware and network infrastructure but also in the cultivation of students' digital literacies and positive mindsets toward technology. Enhancing computer-based proficiencies empowers learners to navigate complex information landscapes efficiently (UNESCO, 2018). Likewise, facilitating seamless access to course materials - regardless of time or location - addresses autonomy and relatedness needs central to Self-Determination Theory (Deci & Ryan, 1980), thereby fostering intrinsic motivation for study.

5.2. Managerial recommendations

- Digital Literacy Workshops: Establish mandatory training sessions focused on advanced information-use techniques (e.g., database searching, data visualization), thereby reinforcing students' capability to leverage digital resources.

- Flexible Learning Ecosystems: Expand institutional support for cloud-based platforms and virtual desktop infrastructures that permit 24/7 access to educational software and materials.

- Attitude-Shaping Interventions: Integrate brief, reflective modules on the benefits of technology use into existing curricula to nurture positive perceptions and combat technostress.

- Active Learning Incentives: Encourage faculty to embed technology-mediated collaborative projects (e.g., peer review via learning-management systems), thereby reinforcing engagement and deeper learning.

- Connectivity Assurance: Collaborate with service providers to offer subsidized high-speed campus Wi-Fi and negotiate student data-plan discounts, ensuring that connectivity barriers do not hinder academic efforts.

5.3. Study limitations and future research

This investigation is subject to several constraints. First, its cross-sectional design limits causal inferences; longitudinal studies would better capture how laptop competencies and attitudes evolve over time. Second, reliance on self-reported measures may introduce response biases. Future research could incorporate objective usage logs and performance analytics. Third, the sample is confined to third-year students at a single Vietnamese university; expanding to diverse institutions and student cohorts would strengthen generalizability. Finally, the mediating roles of motivational constructs (e.g., task value) and potential moderating influences (e.g., teaching quality) remain unexplored and warrant further examination.

In the digital era, fostering students' technical proficiencies, flexible access to resources, and constructive attitudes toward technology emerges as an integrated strategy to elevate academic performance. Institutions that adopt a holistic approach - combining digital literacy education, robust infrastructure, and pedagogical innovation - will be better positioned to meet the evolving needs of learners. As higher education continues to embrace technology, these managerial measures will be instrumental in shaping resilient, self-determined students capable of thriving in digitally mediated learning environments.

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HƯỚNG ĐẾN TIÊU DÙNG XANH VÀ PHÁT TRIỂN BỀN VỮNG: VAI TRÒ CỦA KHẢ NĂNG TIẾP NHẬN QUẢNG CÁO XANH THÚC ĐẨY Ý ĐỊNH MUA THỰC PHẨM XANH

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TÓM TẮT

Với sự suy thoái môi trường toàn cầu do nhu cầu và tiêu thụ thực phẩm thông thường, tiêu thụ thực phẩm xanh sẽ chống lại sự suy thoái này bằng cách tăng lượng tiêu thụ thực phẩm bền vững của người tiêu dùng. Vì sự phát triển thực phẩm hữu cơ ở Việt Nam vẫn còn trong giai đoạn trứng nước như một thị trường ngách, nghiên cứu về tiếp thị xanh với các ứng dụng cục bộ vẫn còn khan hiếm và không thúc đẩy đáng kể nhu cầu thực phẩm hữu cơ. Nghiên cứu này nhằm mục đích khám phá vai trò của khả năng tiếp nhận quảng cáo xanh thúc đẩy ý định mua thực phẩm xanh thông qua khảo sát 298 người tiêu dùng thực phẩm xanh thế hệ gen Z tại Thành phố Hồ Chí Minh bằng phương pháp lấy mẫu thuận tiện. Kết quả chỉ ra rằng khả năng tiếp nhận quảng cáo xanh ảnh hưởng tích cực đến niềm tin thương hiệu xanh và ý định mua thực phẩm xanh. Hơn nữa, niềm tin thương hiệu xanh tác động tích cực đến ý định mua thực phẩm xanh. Bên cạnh đó, nghiên cứu cũng chỉ ra rằng khả năng tiếp nhận quảng cáo xanh tác động đến ý định mua thực phẩm xanh thông qua trung gian niềm tin thương hiệu xanh. Phát hiện này hữu ích cho các nhà tiếp thị và nhà sản xuất thực phẩm xanh để xác định các chiến lược tiếp thị xanh.

Từ khóa: “Thực phẩm xanh”; “Quảng cáo xanh”; “Marketing xanh”; “Thương hiệu xanh”.

1. ĐẶT VẤN ĐỀ

Tiêu thụ thực phẩm ở các nền kinh tế công nghiệp đã chuyển sang một loạt các lựa chọn thực phẩm cân bằng về mặt xã hội và đa dạng, bao gồm thực phẩm hữu cơ (Latip và cộng sự, 2020; Naja & Hamadeh, 2020). Nỗ lực phát triển bền vững của những người tham gia thị trường trong việc quảng bá sản phẩm và dịch vụ của họ có liên quan chặt chẽ với tiếp thị xanh, bao gồm một yếu tố và nỗ lực phát triển bền vững về môi trường đặc biệt giúp hiểu được ý định mua hàng thực phẩm xanh của người tiêu dùng (Latip và cộng sự, 2020).

Trong những năm gần đây, để ứng phó với những thách thức ngày càng gia tăng về môi trường, các công ty được yêu cầu phải thể hiện hình ảnh tốt của mình và hứa hẹn nhiều lợi ích về môi trường hơn những gì họ hiện cung cấp cho người tiêu dùng có ý thức về môi trường (Sun và cộng sự, 2020). Đồng thời, nhận thức của mọi người về tầm quan trọng của việc bảo vệ môi trường không ngừng được cải thiện, đến mức dần dần trở thành sự đồng thuận giữa tất cả các quốc gia trên thế giới với mục tiêu đạt được sự phát triển bền vững (Wu & Long, 2024). Người tiêu dùng trong thế kỷ 21 ngày càng nhận thức rõ hơn về những tác động tiêu cực của các mô hình tiêu dùng đối với môi trường. Điều này đã thúc đẩy sự chuyển dịch sang các hành vi tiêu dùng bền vững, nhằm đảm bảo phúc lợi cho các thế hệ tương lai (Jaiswal và Singh, 2018).

Các doanh nghiệp hiện đang phát triển nhiều chiến dịch truyền thông xanh nhằm kích thích khách hàng mua các sản phẩm xanh (Klockner, 2015). Truyền thông xanh, tập trung vào việc khách hàng nhận thức và những nhận thức này định hình thái độ và hành vi của họ đối với môi trường (Jarreau và cộng sự, 2017). Sự thay đổi này đang làm nảy sinh các chiến dịch quảng cáo xanh, với các nhà tiếp thị tận dụng nó để khuyến khích sử dụng sản phẩm thân thiện với môi trường (Bailey và cộng sự, 2018).

Sự trỗi dậy của quảng cáo xanh như một công cụ xúc tiến bán hàng hấp dẫn đang gia tăng, thu hút nhiều người quan tâm đến việc mua các sản phẩm xanh (Melović và cộng sự, 2020). Tuy nhiên, bất chấp những lợi thế được nhận thấy, sự hoài nghi của người tiêu dùng về độ tin cậy của quảng cáo xanh vẫn còn phổ biến. Người ta vẫn nghi ngờ liệu các sản phẩm xanh có thực sự mang lại lợi ích sinh thái so với các sản phẩm không xanh hay không (Moussa & Touzani, 2008; Peattie, 2010). Các vấn đề về lòng tin và uy tín trở thành trọng tâm trong bối cảnh này (Moussa & Touzani, 2008; Nguyen-

Viet, 2022).

Năng lực tiếp thu quảng cáo xanh đề cập đến việc người tiêu dùng chấp nhận các quảng cáo xanh (Sun và cộng sự, 2021). Theo Bailey và cộng sự (2016), phản ứng của người tiêu dùng đối với truyền thông và nhu cầu về môi trường khác nhau đáng kể tùy thuộc vào năng lực tiếp thu truyền thông xanh, đặc biệt là năng lực tiếp thu quảng cáo xanh. Một vài nghiên cứu về năng lực tiếp thu quảng cáo xanh ảnh hưởng có lợi đến niềm tin thương hiệu xanh (Nguyen-Viet, 2022; Sun và cộng sự, 2020; Nguyen-Viet & Thanh Tran, 2024) cũng như tác động của nó đến ý định sử dụng sản phẩm xanh (Wu & Long, 2024; Nauman, 2024; Jog & Singhal, 2024; Nguyen-Viet & Thanh Tran, 2024). Bên cạnh đó, niềm tin thương hiệu xanh trong lòng khách hàng có mối quan hệ đồng thuận với ý định tiêu dùng xanh (Amin & Tarun, 2020; Nguyen-Viet, 2022; Rahman & Nguyen-Viet, 2023; Nguyen-Viet & Thanh Tran, 2024).

Các nghiên cứu trước đây đã chỉ ra rằng việc giảm thiểu tác hại đối với môi trường do tăng cường hành vi tiêu dùng xanh sẽ cực kỳ có lợi cho môi trường. Do đó, hành vi tiêu dùng xanh đóng vai trò quan trọng trong việc thiết lập và duy trì bảo vệ môi trường. Nghiên cứu này nhằm mục đích xem xét quảng cáo xanh để nâng cao niềm tin thương hiệu xanh của doanh nghiệp và dẫn đến ý định mua thực phẩm xanh của người tiêu dùng Việt Nam. Ngoài ra, nghiên cứu sử dụng mô hình Kích thích - Cơ chế - Phản ứng (SOR) để cung cấp bằng chứng thực nghiệm. Hơn nữa, nghiên cứu đưa ra các đề xuất để nâng cao hiệu quả quảng cáo xanh phù hợp hơn với nhận thức của người tiêu dùng Việt Nam.

2. CƠ SỞ LÝ THUYẾT VÀ PHƯƠNG PHÁP NGHIÊN CỨU

2.1. Cơ sở lý thuyết

Nghiên cứu này dựa trên lý thuyết Kích thích - Cơ chế - Phản ứng (Stimulus–Organism–Response) (Jacoby, 2002). SOR có thể giải thích những khác biệt về hành vi phát sinh từ nhiều kích thích tiếp thị và các yếu tố nhận thức (Sultan và cộng sự, 2021). Các nghiên cứu trước đây về tiêu dùng xanh đã sử dụng lý thuyết SOR để giải thích cách các yếu tố bên ngoài ảnh hưởng đến đánh giá nhận thức và tình cảm của người tiêu dùng, từ đó xác định ý định hành vi của họ (Gil & Jacob, 2018; Nguyen-Viet, 2022; Sun và cộng sự, 2020). Trong nghiên cứu này năng lực tiếp thu quảng cáo xanh là yếu tố kích thích, niềm tin thương hiệu xanh được khái niệm hóa như là yếu tố của cơ chế và ý định mua xanh được coi là yếu tố phản ứng.

2.2. Giả thuyết và mô hình nghiên cứu

2.2.1. Năng lực tiếp thu quảng cáo xanh; niềm tin thương hiệu xanh và ý định mua thực phẩm xanh

Quảng cáo xanh là loại hình quảng cáo tập trung vào việc làm nổi bật các lợi ích môi trường gắn liền với việc sử dụng các sản phẩm cụ thể, chẳng hạn như hạn chế phát thải khí nhà kính hoặc giảm thiểu tình trạng ô nhiễm nước và tạo điều kiện cho việc giải thích sinh học (Nyilasy và cộng sự, 2014). Năng lực tiếp thu quảng cáo xanh đề cập đến mức độ chấp nhận của người tiêu dùng đối với quảng cáo xanh. Khi người tiêu dùng tiếp xúc với quảng cáo xanh, cảm xúc và phán đoán của họ được hình thành, ảnh hưởng đến thái độ của họ đối với bản thân quảng cáo xanh và niềm tin của họ vào các thương hiệu xanh hoặc sản phẩm xanh (Bailey và cộng sự, 2016).

Việc truyền tải thông điệp chính xác và trung thực thông qua quảng cáo đóng vai trò quan trọng trong việc xây dựng lòng tin và uy tín thương hiệu (Nguyen Viet & Nguyen Anh, 2021; Nguyen-Viet, 2022). Bên cạnh đó, khi tiếp xúc với quảng cáo, người tiêu dùng sẽ hình thành cảm xúc (ảnh hưởng) và phán đoán (nhận thức), qua đó tác động đến mức độ tin cậy của họ đối với thương hiệu (Nagar, 2015). Trong bối cảnh quảng cáo xanh, thông tin cung cấp thường gắn liền với các ảnh hưởng đến môi trường của hoạt động kinh doanh, chủ yếu xoay quanh nguyên liệu thô, quy trình sản xuất, hậu cần, và các hoạt động sau khi sử dụng sản phẩm (Leonidou và cộng sự, 2011). Năng lực tiếp thu của người tiêu dùng đối với quảng cáo xanh có khả năng củng cố mối liên hệ giữa tính hấp dẫn của thông điệp xanh và niềm tin vào thương hiệu, đồng thời tác động tích cực đến niềm tin của người tiêu dùng vào thương hiệu xanh (Bailey và cộng sự, 2016; Nguyen-Viet, 2022; Sun và cộng sự, 2020). Bên cạnh đó, Nguyen-Viet & Thanh Tran (2024) nhận định rằng năng lực tiếp thu quảng cáo xanh gia tăng niềm tin thương hiệu xanh của khách hàng.

Một vài nghiên cứu chỉ ra rằng quảng cáo xanh nhằm mục đích tác động đến ý định mua của người tiêu dùng bằng cách thúc đẩy họ chọn mua các sản phẩm thân thiện với môi trường, đồng thời giúp họ nhận thức được lợi ích tích cực đối với cả bản thân và môi trường (Rahbar & Abdul Wahid, 2011). Do đó, năng lực tiếp thu quảng cáo xanh được cho là có mối quan hệ tích cực với ý định mua sản phẩm xanh của người tiêu dùng (Chang và cộng sự, 2015). Phát hiện của Sun

và cộng sự (2021) nêu rõ rằng tác động của năng lực tiếp thu quảng cáo xanh đối với ý định mua sản phẩm xanh của người tiêu dùng là tích cực. Ying và cộng sự (2020) đã nghiên cứu mối tương quan giữa năng lực tiếp thu quảng cáo xanh và ý định mua sản phẩm có nhãn sinh thái của người tiêu dùng. Bên cạnh đó, Joyal-Desmarais và cộng sự (2022) cũng cho rằng năng lực tiếp thu quảng cáo xanh có sự tương quan tích cực đến ý định mua sản phẩm xanh. Hơn nữa, năng lực tiếp thu quảng cáo xanh có mối liên hệ đồng biến với ý định mua xanh (Wu & Long, 2024; Tewari và cộng sự, 2022; Latip và cộng sự, 2023; Nauman, 2024; Jog & Singhal, 2024; Nguyen-Viet & Thanh Tran, 2024). Dựa trên các tài liệu trước, nghiên cứu này đưa ra giả thuyết rằng:

H_1: Năng lực tiếp thu quảng cáo xanh ảnh hưởng tích cực đến niềm tin thương hiệu xanh.

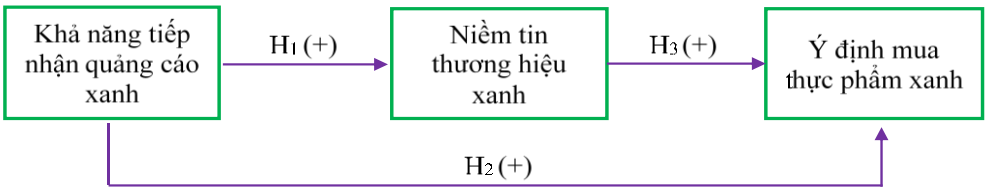
H_2: Năng lực tiếp thu quảng cáo xanh ảnh hưởng tích cực đến ý định mua thực phẩm xanh.

2.2.2. Niềm tin thương hiệu xanh và ý định mua thực phẩm xanh

Niềm tin vào thương hiệu dựa trên niềm tin của người tiêu dùng rằng thương hiệu đó có tính nhất quán, có năng lực, trung thực và có trách nhiệm (Doney & Cannon, 1997). Theo định nghĩa của Chen (2010), niềm tin thương hiệu xanh là sự tin tưởng và sự phụ thuộc mà người tiêu dùng đặt vào các tuyên bố về môi trường của một sản phẩm, dịch vụ hoặc thương hiệu, cùng với khả năng đáp ứng các cam kết về sinh thái của sản phẩm, dịch vụ hoặc thương hiệu đó. Trong bối cảnh xanh, niềm tin là sự sẵn lòng của người tiêu dùng trong việc tin tưởng vào một thương hiệu dựa trên niềm tin hoặc kỳ vọng rằng thương hiệu đó đáng tin cậy, quan tâm và có khả năng thực hiện hiệu quả về môi trường (Martínez, 2015).

Do đó, niềm tin xanh có thể dẫn đến ý định mua hàng mạnh mẽ hơn (Kahraman & Kazançoglu, 2019; Ng và cộng sự, 2018). Các nghiên cứu trước cho thấy niềm tin là một trong những yếu tố quan trọng quyết định ý định mua hàng xanh của người tiêu dùng (Chen, 2010; Gil & Jacob, 2018; Konuk và cộng sự, 2015). Nghiên cứu gần đây hỗ trợ những phát hiện này và cho thấy rằng niềm tin vào các thương hiệu xanh ảnh hưởng tích cực đến ý định mua sản phẩm xanh của người tiêu dùng (Amin & Tarun, 2020; Nguyen-Viet, 2022). Hơn nữa, Rahman & Nguyen-Viet (2023); Nguyen-Viet & Thanh Tran (2024) nhận định rằng niềm tin thương hiệu xanh có hiệu ứng tích cực với ý định mua xanh. Dựa trên những phát hiện này, giả thuyết rằng:

H3: Niềm tin thương hiệu xanh ảnh hưởng tích cực đến ý định mua thực phẩm xanh.



Hình 1. Mô hình nghiên cứu đề xuất

2.3. Phương pháp nghiên cứu

2.3.1. Thiết kế bảng câu hỏi và thang đo nghiên cứu

Bảng câu hỏi được tạo dựa trên bản tiếng Anh thu thập từ các nghiên cứu trước, sau đó được dịch sang tiếng Việt. Tiếp theo, bảng câu hỏi đã được kiểm thử thông qua cuộc phỏng vấn với một nhóm gồm 10 người là những khách hàng tích cực tham gia vào các hoạt động tiêu dùng thực phẩm xanh. Mục tiêu của cuộc phỏng vấn này là điều chỉnh thang đo để đảm bảo tính khả dụng và phản ánh đúng với bối cảnh thực tế của nghiên cứu. Các câu hỏi khảo sát chia thành hai phần chính: (1) mô tả chi tiết về đặc điểm cá nhân của người tham gia khảo sát và (2) mô tả chi tiết về các khái niệm nghiên cứu.

Thang đo nghiên cứu: Niềm tin thương hiệu xanh được đo lường bởi 4 biến quan sát và ý định mua thực phẩm xanh được đo lường bởi 3 biến quan sát chấp nhận từ Konuk và cộng sự (2015); Năng lực tiếp thu quảng cáo xanh được đo lường bởi 4 biến quan sát chấp nhận Tewari và cộng sự (2022).

2.3.2. Mẫu nghiên cứu

Một cuộc khảo sát trên người tiêu dùng thực phẩm xanh thuộc thế hệ gen Z tại Thành phố Hồ Chí Minh. Phương pháp lấy mẫu thuận tiện để thiết kế nghiên cứu. Sau đó, bảng câu hỏi được gửi dưới dạng điện tử đến các đáp viên là sinh viên các trường đại học tại Thành phố Hồ Chí Minh. Thu thập dữ liệu được thực hiện trong 3 tháng (từ tháng 6/2024 đến

9/2024) thu được 298 mẫu được sử dụng.

2.3.3. Kỹ thuật xử lý dữ liệu

Nghiên cứu áp dụng mô hình PLS-SEM để phân tích dữ liệu, trong đó mô hình đo lường được đánh giá thông qua các chỉ số như độ tin cậy tổng hợp, giá trị hội tụ và giá trị phân biệt. Mô hình cấu trúc được kiểm tra dựa trên các tiêu chí như phần dư bình phương trung bình gốc được chuẩn hóa (SRMR), hệ số đa cộng tuyến (VIF), độ liên quan dự đoán (Q^2), và hệ số xác định (R^2). Phần mềm SmartPLS 3 được sử dụng để thực hiện các phân tích này.

3. KẾT QUẢ NGHIÊN CỨU VÀ THẢO LUẬN

3.1. Đặc điểm mẫu nghiên cứu

Mẫu gồm 298 đáp viên tiêu dùng thực phẩm xanh thuộc thế hệ gen Z tại Thành phố Hồ Chí Minh.

Bảng 1. Đặc điểm mẫu nghiên cứu

Tiêu chí	Nhóm	Tần suất	Tỷ lệ (%)
Giới tính	Nam	142	47,7
	Nữ	156	52,3
Xem quảng cáo xanh	Đã xem	219	73,5
	Chưa xem	79	29,5
Tần suất mua	1 đến 5 lần	111	37,3
	6 đến 10 lần	7	2,4
	11 đến 15 lần	7	2,3
	16 đến 20 lần	6	2,1
	Hơn 20 lần	4	1,2
	Mỗi ngày	14	4,8
	Hàng tuần	4	1,2
	Hàng tháng	29	9,6
	Thường xuyên	25	8,4
	Không nhớ	91	30,7

3.2. Đánh giá độ tin cậy thang đo

3.2.1. Kết quả phân tích độ tin cậy thang đo và giá trị hội tụ

Kết quả độ tin cậy thang đo (Bảng 2) đã đo lường độ tin cậy bằng độ tin cậy tổng hợp, đạt giá trị từ 0,959 - 0,977. Tính nhất quán nội bộ bằng Cronbach's Alpha đạt giá trị hơn 0,6. Giá trị hội tụ bằng hệ số tải nhân tố chuẩn hóa từ 0,591-0,918 và phương sai trung bình từ 0,897 – 0,973. Đáp ứng giá trị hội tụ.

Bảng 2. Kết quả đánh giá độ tin cậy

	Loading	α	CR	AVE
Niềm tin thương hiệu xanh (GT)				
GT1	0,961	**0,967**	**0,976**	**0,910**
GT2	0,958			
GT3	0,967			
GT4	0,930			
Năng lực tiếp thu quảng cáo xanh (RGA)				
RGA1	0,917	**0,942**	**0,959**	**0,853**
RGA2	0,897			
RGA3	0,941			
RGA4	0,937			
Ý định mua xanh (PI)				
PI1	0,958	**0,965**	**0,977**	**0,934**
PI2	0,973			

PI3	0,967

3.2.2. Kết quả phân tích giá trị phân biệt

Giá trị phân biệt, đo bằng hệ số Fornell-Larcker (Bảng 3), cho thấy tất cả các căn bậc hai của giá trị phương sai trung bình đều cao hơn giá trị tương quan với các khái niệm khác (Fornell & Larcker, 1981). Đáp ứng giá trị phân biệt.

Bảng 3. Kết quả giá trị phân biệt

	GRA	GT	PI
GRA	**0,923**		
GT	0,906	**0,954**	
PI	0,886	0,862	**0,966**

3.3. Kết quả kiểm định mô hình và giả thuyết

Mô hình được đánh giá với các chỉ số như SRMR (0,038), VIF (1,418-2,762), Q^2 (0,743 và 0,745), và R^2 (0,822 và 0,804). Kết quả cho thấy mô hình phù hợp với khuôn khổ nghiên cứu. Bootstrapping (5.000 lượt) xác nhận ý nghĩa thống kê, chấp nhận H1- H3 (bảng 4 và hình 2). Hơn nữa, kết quả còn cho thấy niềm tin thương hiệu xanh đóng vai trò trung gian giữa năng lực tiếp thu quảng cáo xanh và ý định mua xanh (bảng 5).

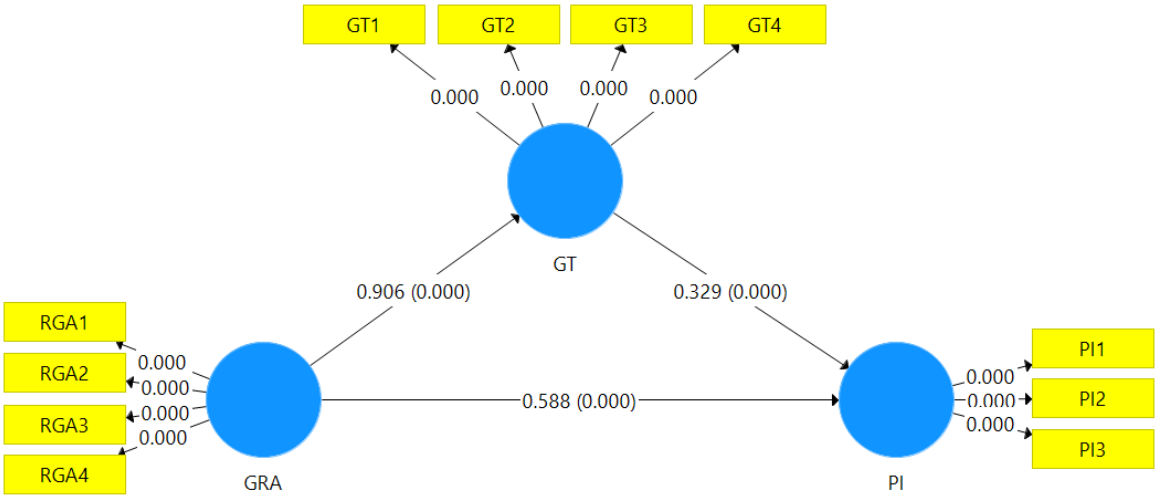
Bảng 4. Kết quả kiểm tra giả thuyết về mối quan hệ trực tiếp

		β	Giá trị P	Kết luận
H1	GRA➔GT	0,906	0,000	Ủng hộ
H2	GRA➔PI	0,588	0,000	Ủng hộ
H3	GT➔PI	0,329	0,000	Ủng hộ

Bảng 5. Kết quả kiểm tra về mối quan hệ trung gian

	β	Giá trị P	Kết luận
GRA➔GT➔PI	0,298	0,000	Ủng hộ

Hình 2. Kết quả mô hình nghiên cứu



3.4. Thảo luận kết quả

Kết quả trong Bảng 4 chỉ ra GRA tích cực tác động đến GT với β = 0,906. Giả thuyết H1 chấp nhận. Phát hiện này phù hợp với các nghiên cứu trước đó của Bailey và cộng sự (2016); Nguyen-Viet (2022); Sun và cộng sự (2020); Nguyen-Viet & Thanh Tran, (2024) năng lực tiếp thu quảng cáo xanh hưởng tích cực đến niềm tin thương hiệu xanh. Điều này cho thấy rằng khi người tiêu dùng tiếp nhận quảng cáo xanh một cách hiệu quả, niềm tin của họ vào thương hiệu xanh sẽ được củng cố.

Tương tự, Bảng 4 cũng chỉ ra rằng GRA có ảnh hưởng tích cực đến PI, với β = 0,588. Giả thuyết H2 chấp nhận. Kết quả này đồng nhất với các nghiên cứu của Wu & Long (2024), Nauman (2024), Jog & Singhal (2024), và Nguyen-Viet

& Thanh Tran (2024), khẳng định rằng khả năng tiếp nhận quảng cáo xanh có ảnh hưởng đáng kể đến ý định mua thực phẩm xanh.

Bảng 4 cũng cung cấp bằng chứng cho thấy GT ảnh hưởng tích cực đến PI, với β = 0,329. Điều này hỗ trợ giả thuyết H3. Phát hiện này phù hợp với các nghiên cứu của Amin & Tarun (2020), Nguyen-Viet (2022), Rahman & Nguyen-Viet (2023), và Nguyen-Viet & Thanh Tran (2024), những nghiên cứu này cũng chỉ ra rằng niềm tin vào thương hiệu xanh đóng vai trò quan trọng trong việc thúc đẩy quyết định mua thực phẩm xanh.

Ngoài ra, Bảng 5 cho thấy rằng GT đóng vai trò trung gian trong mối quan hệ giữa GRA và PI, với hệ số hồi quy β = 0,298. Điều này phù hợp với nghiên cứu của Rahman & Nguyen-Viet (2023), cho thấy rằng tác động của quảng cáo xanh đến ý định mua hàng được truyền tải một phần thông qua niềm tin vào thương hiệu xanh

4. KẾT LUẬN

Ngày nay, các chiến lược tiếp thị truyền đạt những lợi ích xanh mà sản phẩm của doanh nghiệp thực phẩm cho người tiêu dùng thông qua quảng cáo. Ở đây, một điểm quan trọng cần xem xét là liệu người tiêu dùng có khác nhau về năng lực tiếp thu quảng cáo như vậy hay không (Paco và cộng sự, 2019). Bailey và cộng sự (2016) nhấn mạnh tầm quan trọng của việc xác định năng lực tiếp thu quảng cáo xanh cho thông điệp được truyền tải. Từ quan điểm tiếp thị, điều quan trọng là phải có các chiến lược truyền thông khác nhau cho các cá nhân khác nhau về năng lực tiếp thu các thông điệp xanh. Tuy nhiên, trong nghiên cứu về hành vi người tiêu dùng xanh, yếu tố này chưa nhận được nhiều sự quan tâm (Paco và cộng sự, 2019). Do đó, nghiên cứu này cố gắng giải quyết vấn đề quan trọng này và kiểm tra tác động của năng lực tiếp thu quảng cáo xanh đối với niềm tin thương hiệu xanh và ý định tiêu dùng thực phẩm xanh của 298 người tiêu dùng xanh thế hệ gen Z tại Việt Nam.

Nghiên cứu này đã mở rộng kiến thức về chiến lược tiếp thị xanh để nâng cao niềm tin về thương hiệu xanh của doanh nghiệp cũng như thúc đẩy tiêu dùng xanh hướng đến phát triển bền vững. Bên cạnh đó, nghiên cứu cũng nhấn mạnh vai trò trung gian của niềm tin thương hiệu xanh. Ngoài ra, nghiên cứu cũng có hạn chế do tập trung vào người tiêu dùng thực phẩm xanh gen Z cũng như sử dụng thang đo lặp lại từ nước ngoài.

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PHÁT TRIỂN THỰC PHẨM BỀN VỮNG TẠI VIỆT NAM: CƠ HỘI VÀ THÁCH THỨC

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TÓM TẮT

Bài nghiên cứu tập trung vào cơ hội và thách thức trong việc phát triển thực phẩm bền vững tại Việt Nam, một quốc gia vừa chịu ảnh hưởng nghiêm trọng từ biến đổi khí hậu vừa là nhà xuất khẩu nông sản lớn. Biến đổi khí hậu đang gây áp lực lên hệ thống lương thực toàn cầu và làm giảm năng suất cây trồng, trong khi ngành nông nghiệp cũng là nguồn phát thải lớn. Việt Nam có tiềm năng phát triển thực phẩm bền vững nhờ đa dạng sinh học, đất đai màu mỡ, và các sáng kiến chính sách như chiến lược tăng trưởng xanh. Cơ hội lớn đến từ hợp tác quốc tế, nhu cầu tăng cao đối với thực phẩm hữu cơ và công nghệ hiện đại như IoT và giống cây trồng chịu mặn. Tuy nhiên, các thách thức vẫn còn, bao gồm tác động nghiêm trọng từ biến đổi khí hậu ở Đồng bằng sông Cửu Long, cơ sở hạ tầng chưa đảm bảo và sự thiếu hiệu quả trong quản lý. Để thực hiện phát triển bền vững, cần tối ưu hóa nguồn lực, tăng cường phối hợp trong quản lý và nâng cao năng lực của nông dân trong việc áp dụng công nghệ mới.

Từ khóa: “Thực phẩm bền vững”; “Biến đổi khí hậu”; “Chiến lược tăng trưởng xanh”.

1. ĐẶT VẤN ĐỀ

Biến đổi khí hậu làm gián đoạn hệ thống lương thực toàn cầu theo nhiều cách. Nhiệt độ tăng, lượng mưa thất thường, hạn hán kéo dài và tần suất các hiện tượng thời tiết cực đoan tăng ảnh hưởng trực tiếp đến năng suất cây trồng, sức khỏe gia súc và thủy sản (IPCC, 2022). Những gián đoạn này làm trầm trọng thêm tình trạng mất an ninh lương thực, đặc biệt là ở những khu vực phụ thuộc nhiều vào nông nghiệp để kiếm sống. Ngược lại, bản thân ngành nông nghiệp là tác nhân chính gây ra biến đổi khí hậu, tạo ra gần một phần ba lượng khí thải GHG toàn cầu thông qua các hoạt động như phá rừng, phát thải khí mê-tan từ chăn nuôi và sử dụng quá nhiều phân bón hóa học. Do đó, việc giảm thiểu tác động của nông nghiệp đối với môi trường trong khi vẫn đảm bảo sản xuất bền vững là rất quan trọng để giải quyết cuộc khủng hoảng khí hậu toàn cầu (Willett và cộng sự, 2019).

Phát triển thực phẩm bền vững cung cấp một giải pháp bằng cách tích hợp các hoạt động thân thiện với môi trường vào sản xuất và tiêu thụ thực phẩm. Nó nhấn mạnh việc sử dụng hiệu quả các nguồn tài nguyên thiên nhiên, giảm chất thải và thúc đẩy đa dạng sinh học để tạo ra các hệ thống có khả năng phục hồi trước biến đổi khí hậu (FAO Vietnam, 2022). Các xu hướng chính trong lĩnh vực này bao gồm việc áp dụng các hoạt động nông nghiệp thông minh, sử dụng công nghệ, thúc đẩy chế độ ăn dựa trên thực vật và tăng cường các hệ thống thực phẩm địa phương. Sự chuyển dịch theo hướng bền vững cũng được thúc đẩy bởi sở thích của người tiêu dùng, các biện pháp can thiệp của chính sách và những tiến bộ trong nghiên cứu nông nghiệp (OECD, 2022).

Việt Nam là nước xuất khẩu nông sản hàng đầu thế giới, đặc biệt là gạo, cà phê và hải sản, nền kinh tế Việt Nam phụ thuộc rất nhiều vào hệ thống sản xuất lương thực. (MARD, 2023). Tuy nhiên, cũng là quốc gia dễ bị tổn thương nhất trước biến đổi khí hậu, với mực nước biển dâng cao, xâm nhập mặn và các hiện tượng thời tiết khắc nghiệt đe dọa các vùng đất nông nghiệp trọng điểm của đất nước, đặc biệt là Đồng bằng sông Cửu Long (Nguyen và cộng sự, 2020). Bên cạnh thách thức thì Việt Nam vẫn có tiềm năng đáng kể để phát triển lương thực bền vững. Đa dạng sinh học phong phú, đất đai màu mỡ và nhận thức ngày càng tăng của người tiêu dùng về các hoạt động bền vững đưa đất nước trở thành quốc gia có tiềm năng dẫn đầu trong lĩnh vực nông nghiệp bền vững. Các sáng kiến chính sách như chiến lược tăng trưởng xanh quốc gia và hợp tác quốc tế nhấn mạnh cam kết của Việt Nam trong việc tích hợp các hoạt động bền vững vào hệ thống nông nghiệp của mình. Ngoài ra, động lực thị trường, bao gồm nhu cầu toàn cầu ngày càng tăng đối với thực phẩm hữu cơ và được sản xuất bền vững, tạo ra cơ hội để Việt Nam tận dụng các nguồn lực nông nghiệp của mình trong khi vẫn tuân thủ các nguyên tắc bền vững (GOV, 2021).

Những tác động biến đổi khí hậu đe dọa đến an ninh lương thực của Việt Nam, vì hơn 60% dân số làm nghề nông và ngành này chiếm 14% GDP. Các nghiên cứu đã chỉ ra rằng biến đổi khí hậu đã ảnh hưởng đến năng suất nông nghiệp ở

Việt Nam. Năng suất lúa dự kiến sẽ giảm từ 0,41 tấn/ha xuống 0,63 tấn/ha vào năm 2050 nếu không có các biện pháp giảm thiểu thích hợp (Phung Phi Tran, 2024).

Năng suất lúa và ngô của Việt Nam có thể giảm lần lượt 8,8% và 18,7% vào năm 2030 và 15,1% và 32,9% vào năm 2050. Nếu mực nước biển dâng 100 cm, 32,2% đất nông nghiệp có nguy cơ bị ngập lụt. Theo kịch bản biến đổi khí hậu, nếu năng suất lúa và diện tích canh tác không thay đổi mà không có biện pháp thích ứng, Việt Nam sẽ có nguy cơ mất 21,4% sản lượng lúa vào năm 2100. Tác động của biến đổi khí hậu đến chăn nuôi bao gồm những thay đổi về sản lượng và chất lượng thức ăn chăn nuôi, gia tăng dịch bệnh. Chăn nuôi lợn dự kiến sẽ giảm khoảng 8,2% về số lượng. Xâm nhập mặn sẽ làm giảm đáng kể diện tích nuôi trồng thủy sản nước ngọt, ảnh hưởng đến môi trường sinh thái và làm thay đổi đa dạng sinh học (DCC, 2023).

Các nghiên cứu gần đây đã chỉ ra những tác động tiêu cực của biến đổi khí hậu lên nông nghiệp Việt Nam và đề xuất các chiến lược thích ứng khác nhau (Nguyen và cộng sự, 2020). Đồng thời, sự quan tâm đến thực phẩm bền vững như một giải pháp tích hợp các hoạt động thân thiện với môi trường vào sản xuất và tiêu thụ thực phẩm ngày càng gia tăng trên toàn cầu (Willett và cộng sự, 2019). Mặc dù đã có những nghiên cứu về tác động của biến đổi khí hậu và các khía cạnh khác nhau của nông nghiệp bền vững ở Việt Nam, vẫn còn thiếu các phân tích chuyên sâu về cơ hội và thách thức cụ thể trong việc phát triển thực phẩm bền vững một cách toàn diện, đặc biệt trong bối cảnh các chính sách tăng trưởng xanh đang được thúc đẩy mạnh mẽ. Bài viết này nhằm mục đích khám phá những cơ hội và thách thức này, góp phần làm sáng tỏ con đường phát triển thực phẩm bền vững tại Việt Nam.

2. TỔNG QUAN THỰC PHẨM BỀN VỮNG VÀ PHƯƠNG PHÁP NGHIÊN CỨU

2.1. Tổng quan thực phẩm bền vững

2.1.1. Hệ thống thực phẩm bền vững

Hệ thống thực phẩm bền vững là hệ thống cung cấp an ninh lương thực và dinh dưỡng cho tất cả mọi người đảm bảo sự phát triển kinh tế, xã hội và môi trường nhằm tạo ra an ninh lương thực và dinh dưỡng cho các thế hệ tương lai không bị tổn hại (FAO, 2018). Tính bền vững trong hệ thống thực phẩm phải cân bằng giữa hiệu quả sản xuất, hệ sinh thái và nhu cầu của xã hội, đồng thời xem xét toàn bộ chuỗi cung ứng từ trang trại đến bàn ăn (Willett và cộng sự, 2019). Hệ thống thực phẩm bền vững dựa trên các nguyên tắc nông nghiệp xanh, tận dụng đa dạng sinh học, đầu vào tự nhiên và kiến thức của người nông dân để đạt được tính bền vững về sinh thái và kinh tế xã hội (Altieri & Nicholls, 2017).

2.1.2. Thực phẩm bền vững

Thực phẩm bền vững là các sản phẩm nông nghiệp đáp ứng các tiêu chuẩn bảo vệ môi trường nghiêm ngặt, được sản xuất mà không có đầu vào hóa học gây hại và duy trì sự cân bằng giữa an toàn thực phẩm và bảo tồn sinh thái (Gale và cộng sự, 2019). Các sản phẩm thực phẩm bền vững nhấn mạnh đầu vào nông nghiệp bền vững, bảo tồn năng lượng và hiệu quả sử dụng tài nguyên để giảm thiểu suy thoái môi trường (Wang và cộng sự, 2020). Bên cạnh đó, thực phẩm có nguồn gốc từ các giống cây trồng địa phương không chỉ có khả năng chống chịu với khí hậu mà còn góp phần bảo tồn đa dạng sinh học và di sản văn hóa, hỗ trợ các hệ thống thực phẩm truyền thống (Padulosi và cộng sự, 2013). Hơn nữa, giống cây trồng bản địa có giá trị dinh dưỡng cao và khả năng thích ứng với môi trường địa phương, đảm bảo hệ thống thực phẩm bền vững đồng thời giảm sự phụ thuộc vào cây trồng độc canh (Hunter và cộng sự, 2017). Hơn nữa, TCVN 11041 – tiêu chuẩn về nông nghiệp bền vững là bộ tiêu chuẩn quốc gia chính thức, đặt nền móng cho việc sản xuất, chế biến và chứng nhận sản phẩm bền vững tại Việt Nam.

2.2. Phương pháp nghiên cứu

Tổng quan có hệ thống các bài báo, báo cáo chính sách và ấn phẩm của chính phủ về hệ thống thực phẩm bền vững, các hoạt động thực phẩm xanh và phát triển thực phẩm từ thực vật tại địa phương. Bên cạnh đó, phương pháp phân tích nội dung để chỉ ra thách thức và cơ hội cụ thể của Việt Nam trong việc phát triển thực phẩm bền vững.

3. CƠ HỘI PHÁT TRIỂN THỰC PHẨM BỀN VỮNG TẠI VIỆT NAM

3.1. Chính sách và hợp tác quốc tế

Các chính sách đã thể hiện cam kết mạnh mẽ đối với phát triển bền vững thông qua chiến lược tăng trưởng xanh của quốc gia (2021–2030 và tầm nhìn đến năm 2050). Chiến lược này ưu tiên tích hợp tính bền vững về môi trường vào các chính sách nông nghiệp, nhấn mạnh vào các hoạt động canh tác ít carbon và sử dụng năng lượng tái tạo trong các hệ thống

sản xuất lương thực. Các chính sách như Quyết định số 1393/QD-TTg, thể chế hóa tăng trưởng xanh, nhằm mục đích giảm phát thải khí nhà kính đồng thời tăng năng suất nông nghiệp (GOV, 2021). Hơn nữa, Việt Nam cũng đẩy mạnh hợp tác quốc tế như chương trình Phát triển Liên hợp quốc (UNDP), Tổ chức Lương thực và Nông nghiệp (FAO) và Ngân hàng Thế giới đã mang lại nguồn lực tài chính và chuyên môn kỹ thuật để hỗ trợ các dự án như nông nghiệp thông minh thích ứng với khí hậu (CSA) và kiểm soát độ mặn ở Đồng bằng sông Cửu Long (FAO Việt Nam, 2022). Vụ Hợp tác quốc tế (Bộ Nông nghiệp và Phát triển nông thôn) cho biết Chính phủ Việt Nam đã banh hành Quyết định số 300/QĐ-TTg phê duyệt Kế hoạch hành động quốc gia chuyển đổi hệ thống lương thực thực phẩm minh bạch, trách nhiệm và bền vững ở Việt Nam đến năm 2030 với 16 mục tiêu cụ thể.

3.2. Nhu cầu thị trường đối với thực phẩm bền vững

Việt Nam đang trải qua sự thay đổi đáng kể trong hành vi của người tiêu dùng, với sự nhấn mạnh ngày càng tăng về tính bền vững và ý thức về sức khỏe trong các lựa chọn thực phẩm. Quá trình đô thị hóa nhanh chóng và sự mở rộng của tầng lớp trung lưu đã thúc đẩy nhu cầu về các sản phẩm thực phẩm an toàn hơn, hữu cơ và thân thiện với môi trường. Các báo cáo chỉ ra rằng người tiêu dùng thành thị của Việt Nam ngày càng sẵn sàng trả giá cao hơn cho thực phẩm hữu cơ được chứng nhận, bao gồm rau, trái cây, cà phê và hải sản. Theo PwC (2021) khảo sát thói quen tiêu dùng đã chỉ ra 47% đáp viên cho biết họ ưu tiên lựa chọn các sản phẩm có khả năng tự phân hủy. Bên cạnh đó, Nielsen Việt Nam được công bố tại Hội thảo "Chiến lược thương hiệu gắn với phát triển xanh" cho thấy 86% người tiêu dùng Việt sẵn sàng trả thêm để sở hữu sản phẩm từ các thương hiệu có tác động tích cực đến xã hội và môi trường (Phan Thị Lệ Thúy, 2023). Đồng thời, trách nhiệm bảo vệ môi trường của doanh nghiệp ảnh hưởng đến quyết định mua sắm của 62% người tiêu dùng, và có đến 80% lo ngại về các tác hại lâu dài của nguyên liệu nhân tạo. Hơn nữa, các vụ bê bối về an toàn thực phẩm và nhận thức cao hơn về dư lượng hóa chất trong canh tác thông thường đã làm gia tăng thêm nhu cầu về chứng nhận hữu cơ.

Đối với quốc tế, thị trường thực phẩm hữu cơ và bền vững đang mở rộng nhanh chóng, được thúc đẩy bởi nhu cầu của người tiêu dùng đối với các sản phẩm được sản xuất có đạo đức, thân thiện với môi trường và có ý thức về sức khỏe. Thị trường thực phẩm hữu cơ đạt mức định giá hơn 200 tỷ đô la vào năm 2022, với các dự báo cho thấy sự tăng trưởng liên tục do lo ngại ngày càng tăng về biến đổi khí hậu, an toàn thực phẩm và sức khỏe (IFOAM, 2022). Châu Âu và Bắc Mỹ là những thị trường dẫn đầu về thực phẩm bền vững, với người tiêu dùng ngày càng ưu tiên các chứng nhận như GlobalGAP, USDA Organic và EU Organic khi đưa ra quyết định mua hàng bằng chứng cho thấy xuất khẩu gạo hữu cơ của Việt Nam sang Liên minh châu Âu (EU) đã tăng 20% trong giai đoạn 2019-2022, nhờ tuân thủ các tiêu chuẩn hữu cơ nghiêm ngặt của EU (WTO, 2023). Theo số liệu thống kê, lượng sản phẩm hữu cơ nhập khẩu từ Việt Nam vào Liên minh châu Âu (EU) năm 2023 là 12.471 tấn (WTO, 2023).

3.3. Đổi mới công nghệ

Đổi mới trong ngành thực phẩm bền vững của Việt Nam đang được thúc đẩy bởi việc ứng dụng các công nghệ tiên tiến, phát triển các loại cây trồng thích nghi với khí hậu và sử dụng các giống cây trồng địa phương. Ứng dụng công nghệ trong nông nghiệp, cảm biến từ xa và hệ thống tưới tiêu hỗ trợ Internet vạn vật (IoT) đang ngày càng được áp dụng để tối ưu hóa việc sử dụng tài nguyên, nâng cao năng suất và giảm tác động đến môi trường. Ví dụ, các hệ thống tưới tiêu thông minh ở Đồng bằng sông Cửu Long đã giảm 30% lượng nước lãng phí, giải quyết các thách thức do xâm nhập mặn và lượng mưa thất thường (Ngân hàng Thế giới, 2023). Việc phát triển các loại cây trồng có khả năng chống chịu với khí hậu, bao gồm các giống lúa chịu mặn và chịu hạn của Viện Hàn lâm Khoa học Nông nghiệp Việt Nam (VAAS), đã trở nên quan trọng để đảm bảo an ninh lương thực ở các vùng dễ bị tổn thương. Các loại cây trồng này được thiết kế để chịu được các điều kiện thời tiết khắc nghiệt, cho phép nông dân thích nghi với các kiểu khí hậu thay đổi (Bộ NN & PTNT, 2023). Ngoài ra, việc sử dụng các giống cây trồng địa phương như Amorphophallus (Nưa) đã trở nên nổi bật trong phát triển lương thực bền vững. Loại cây bản địa này, được biết đến với dấu chân môi trường thấp và giá trị dinh dưỡng cao, đang được chế biến thành các sản phẩm dựa trên glucomannan như mì ít calo, phù hợp với sở thích của người tiêu dùng có ý thức về sức khỏe và bền vững, nhiều nông dân ở An Giang, Trà Vinh chuyển sang trồng. (Trần Văn Tiến và cộng sự, 2017). Bằng cách tích hợp những đổi mới này, Việt Nam đang định vị mình là quốc gia dẫn đầu trong các hệ thống thực phẩm bền vững ứng phó hiệu quả với biến đổi khí hậu

4. THÁCH THỨC PHÁT TRIỂN THỰC PHẨM BỀN VỮNG TẠI VIỆT NAM

4.1. Tác động biến đổi khí hậu

Ngành nông nghiệp của Việt Nam đang phải đối mặt với những thách thức đáng kể do tác động của biến đổi khí hậu. Nhiệt độ tăng cao, hạn hán kéo dài và xâm nhập mặn, đặc biệt là ở Đồng bằng sông Cửu Long, đã đe dọa nghiêm trọng đến năng suất nông nghiệp và an ninh lương thực. Đồng bằng sông Cửu Long, nơi đóng vai trò là "vựa lúa" của Việt Nam và là trung tâm quan trọng cho nuôi trồng thủy sản và trồng cây ăn quả, ngày càng bị ảnh hưởng bởi những thay đổi về môi trường. Những thay đổi này làm gián đoạn năng suất cây trồng, làm giảm khả năng cung cấp nước ngọt để tưới tiêu và gây hại cho hệ sinh thái dưới nước. Theo Nguyen và cộng sự (2020), hậu quả của biến đổi khí hậu ở khu vực này không chỉ gây nguy hiểm cho sản xuất lương thực mà còn có những tác động kinh tế xã hội rộng hơn, đặc biệt là đối với những hộ nông dân sản xuất nhỏ, những người phụ thuộc rất nhiều vào tài nguyên thiên nhiên.

Đồng bằng sông Cửu Long đã phải hứng chịu những đợt hạn hán và xâm nhập mặn nghiêm trọng nhất trong 100 năm qua, đặc biệt là vào các năm 2015–2016 và 2019–2020. Trong năm 2019 và 2020, tình trạng xâm nhập mặn gia tăng đã ảnh hưởng đến 58.000 ha lúa, 6.650 ha cây ăn quả, 1.241 ha rau màu và 8.715 ha nuôi trồng thủy sản ở Đồng bằng sông Cửu Long (ODV, 2022). Đợt hạn hán năm 2016 ở Đồng bằng sông Cửu Long đã gây ra thiệt hại kinh tế trực tiếp lên đến 319,5 triệu USD (Nhung Nguyen, 2022). Những sự kiện này đã dẫn đến tình trạng thiếu nước cho sinh hoạt và sản xuất, ảnh hưởng nặng nề nhất đến các hộ nghèo 2 . Những đợt hạn hán và xâm nhập mặn lặp đi lặp lại và ngày càng nghiêm trọng ở Đồng bằng sông Cửu Long là những ví dụ điển hình về tác động tàn khốc của biến đổi khí hậu đối với một vùng nông nghiệp quan trọng, ảnh hưởng không chỉ đến sản xuất cây trồng mà còn đến sinh kế và đời sống của cộng đồng địa phương (ODV, 2022).

4.2. Nguồn lực và cơ sở hạ tầng

Ngành nông nghiệp của Việt Nam chủ yếu bao gồm những hộ nông dân sản xuất nhỏ, những người cùng nhau phải đối mặt với nhiều thách thức trong việc áp dụng các phương pháp canh tác bền vững. Đất đai bị chia cắt, khả năng tiếp cận vốn tài chính hạn chế và cơ sở hạ tầng không đầy đủ đã hạn chế đáng kể khả năng thực hiện các phương pháp canh tác hiện đại, bền vững của họ. Sản xuất qui mô nhỏ thể hiện qua diện tích canh tác bình quân dao động từ 0,2 đến 2 ha/hộ và chỉ đạt 0,34 ha/lao động. Kết quả khảo sát về qui mô sử dụng đất của nông hộ qua thời gian 10 năm, 2006-2016, cho thấy quy mô đất nhỏ, thay đổi ít, số hộ không trực tiếp sử dụng đất tăng từ 18,23% lên 21,38%, số hộ sử dụng từ 0,2 đến dưới 0,5 ha giảm từ 32,29% xuống còn 27,11%, số hộ có qui mô diện tích đất nông nghiệp dưới 0,2 ha chỉ tăng từ 21,17% lên 22,49%, số hộ có qui mô đất nông nghiệp từ 0,5 đến dưới 1 ha tăng chỉ từ 16,44% lên 16,75%; chỉ có khoảng 5% hộ nông dân có qui mô ruộng đất trên 3 ha (Trần Đức Viên, 2020). Nhiều nông dân không có đủ nguồn lực để đầu tư vào hệ thống thủy lợi tiên tiến, công nghệ canh tác hữu cơ hoặc hạt giống chất lượng cao. Tỷ lệ đói nghèo ở nông thôn cao gấp 3,7 lần thành thị, 40% hộ nông thôn không có tích lũy, 84% lao động nông nghiệp không có tiền để dành trong đó, hộ thuần nông cho thu nhập thấp nhất, những hộ thuần làm nông lâm thủy sản có thu nhập/tháng/người bằng 29% thu nhập/tháng/người nông thôn. Tiềm lực tài chính như vậy, nên người nông dân rất khó tự đầu tư mở rộng sản xuất, tự nâng cao trình độ, hay việc ứng dụng công nghệ để ứng phó môi trường (Trần Đức Viên, 2020). Hơn nữa, những thách thức về hậu cần, chẳng hạn trong tổng số 1.239 km đường cao tốc hiện có của cả nước, vùng Đồng bằng sông Cửu Long đến nay mới hoàn thành khoảng 175 km đường cao tốc. Đó là các đoạn TP.HCM - Trung Lương (49 km), Trung Lương - Mỹ Thuận (51,5 km), Mỹ Thuận - Cần Thơ, vừa hoàn thành cuối 12/2023 (23 km) và tuyến Lộ Tẻ - Rạch Sỏi (51 km), chiếm khoảng 14% tổng chiều dài đường cao tốc hiện có của cả nước (Xuân Nghi, 2024). Những hạn chế này cản trở quá trình chuyển đổi sang hệ thống lương thực bền vững có thể đảm bảo cả bảo vệ môi trường và tăng trưởng kinh tế.

4.3. Chính sách và quản trị

Mặc dù Việt Nam đã áp dụng nhiều chính sách nhằm thúc đẩy phát triển bền vững, nhưng vẫn còn nhiều thách thức trong quá trình thực hiện. Việc thiếu sự phối hợp giữa các bên liên quan thường dẫn đến tình trạng chưa hiệu quả và chồng chéo trong việc thực thi chính sách. Hơn nữa, cơ chế quản lý và sự tham gia không đầy đủ của các bên liên quan chính, bao gồm nông dân, doanh nghiệp tư nhân và các tổ chức phi chính phủ, càng cản trở tiến trình. Hoang và Pham (2022) lập luận rằng việc giải quyết các vấn đề quản trị này là điều cần thiết để đạt được mục tiêu phát triển lương thực bền vững. Cần phải cải thiện khuôn khổ chính sách, tăng cường cơ chế thực thi và áp dụng các phương pháp tiếp cận toàn diện đối với sự hợp tác của các bên liên quan để thu hẹp khoảng cách giữa ý định chính sách và kết quả thực tế.

5. KẾT LUẬN

Phát triển thực phẩm bền vững không chỉ là giải pháp thiết yếu cho vấn đề biến đổi khí hậu mà còn là cơ hội lớn để

Việt Nam củng cố vị thế trong lĩnh vực nông nghiệp. Với vị trí là quốc gia có nền nông nghiệp mạnh mẽ, Việt Nam sở hữu nhiều tiềm năng phát triển hệ thống thực phẩm bền vững nhờ vào sự phong phú về tài nguyên thiên nhiên và cam kết mạnh mẽ từ chính phủ. Các sáng kiến như chiến lược tăng trưởng xanh và hợp tác quốc tế đang mang lại hỗ trợ quan trọng về tài chính và kỹ thuật. Ngoài ra, thị trường tiêu dùng ngày càng ưa chuộng thực phẩm hữu cơ và thân thiện với môi trường cũng thúc đẩy Việt Nam chuyển đổi theo hướng bền vững. Tuy nhiên, để hiện thực hóa tiềm năng này, Việt Nam cần giải quyết nhiều thách thức. Tác động từ biến đổi khí hậu đang làm suy giảm năng suất và đe dọa đến sự bền vững của hệ thống lương thực, đặc biệt ở các khu vực trọng điểm như Đồng bằng sông Cửu Long. Hạn chế về cơ sở hạ tầng và nguồn lực tài chính đối với nông dân cũng là rào cản lớn. Đồng thời, sự thiếu phối hợp trong quản lý và thực thi chính sách làm giảm hiệu quả của các sáng kiến phát triển bền vững. Tương lai của hệ thống thực phẩm bền vững tại Việt Nam phụ thuộc vào việc cải thiện quản trị, nâng cao nhận thức xã hội và tăng cường đầu tư vào nghiên cứu, công nghệ. Việt Nam cần xây dựng một chiến lược tổng thể, tích hợp các giải pháp bền vững từ sản xuất đến tiêu dùng, để đảm bảo đáp ứng nhu cầu hiện tại mà không làm tổn hại đến lợi ích của thế hệ mai sau.

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CÁC YẾU TỐ ẢNH HƯỞNG TỚI HOẠT ĐỘNG NGHIÊN CỨU KHOA HỌC CỦA SINH VIÊN NGÀNH DU LỊCH CÁC TRƯỜNG ĐẠI HỌC TẠI ĐÔNG NAM BỘ

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TÓM TẮT

Nghiên cứu này tập trung khám phá các yếu tố ảnh hưởng đến hoạt động nghiên cứu khoa học (NCKH) của sinh viên ngành Du lịch tại các trường Đại học ở khu vực Đông Nam Bộ. Dựa trên cơ sở lý thuyết và các nghiên cứu trước đây, nghiên cứu đã xác định bốn nhân tố chính tác động đến sự tham gia NCKH của sinh viên: (1) Chính sách và hỗ trợ của trường Đại học, (2) Tài chính, (3) Môi trường nghiên cứu, và (4) Kinh nghiệm NCKH của sinh viên. Phương pháp định lượng được áp dụng với dữ liệu thu thập từ 300 sinh viên, trong đó 278 phiếu khảo sát hợp lệ được đưa vào phân tích. Các công cụ kiểm định độ tin cậy và phân tích dữ liệu bao gồm Cronbach's Alpha, phân tích nhân tố khám phá (EFA), và hồi quy tuyến tính bội, được thực hiện thông qua phần mềm SPSS. Kết quả cho thấy cả bốn yếu tố đều có tác động tích cực đến sự tham gia NCKH của sinh viên. Trong đó, yếu tố Tài chính có ảnh hưởng mạnh nhất, tiếp theo là Môi trường nghiên cứu, Chính sách và hỗ trợ, và Kinh nghiệm NCKH của sinh viên. Kết quả nghiên cứu cung cấp các cơ sở thực tiễn quan trọng để đề xuất các chính sách và giải pháp nhằm nâng cao chất lượng và hiệu quả hoạt động NCKH của sinh viên tại các trường Đại học khu vực Đông Nam Bộ.

Từ khóa: "Du lịch", "Đông Nam Bộ", "nghiên cứu khoa học", "sinh viên", "tài chính".

1. ĐẶT VẤN ĐỀ

Trong bối cảnh giáo dục đại học hiện nay, "học tập dựa trên nghiên cứu" ngày càng đóng vai trò quan trọng, giúp sinh viên (SV) phát triển kỹ năng tư duy phản biện, giải quyết vấn đề, nâng cao hiểu biết về lĩnh vực chuyên môn, đồng thời tạo cơ hội học tập và phát triển bản thân. Đặc biệt, đối với nhóm ngành Du lịch, việc gắn kết giữa nghiên cứu khoa học (NCKH) và thực tiễn nghề nghiệp có ý nghĩa quan trọng trong việc nâng cao chất lượng đào tạo, giúp SV tiếp cận với các vấn đề thực tế của ngành, đồng thời tăng cường sự kết nối giữa nhà nghiên cứu, giảng viên, doanh nghiệp và cơ quan quản lý (Entwistle, 2002). Việc đẩy mạnh NCKH không chỉ mở rộng tri thức khoa học trong xã hội mà còn góp phần cải thiện quá trình đào tạo và nâng cao cơ hội việc làm cũng như học tập sau đại học (Behzad và cộng sự, 2008; Park và cộng sự, 2010). Tuy nhiên, thực tế cho thấy hoạt động NCKH của SV ngành Du lịch vẫn còn gặp nhiều rào cản. Một trong những trở ngại lớn là khả năng tiếp cận các nguồn thông tin, tài liệu nghiên cứu, công cụ phân tích dữ liệu và sự hỗ trợ từ nhà trường (Kotrlik và cộng sự, 2002). Nhiều SV bày tỏ sự hài lòng thấp đối với nguồn tài nguyên từ thư viện và Internet, đồng thời cho rằng cần có sự đầu tư nhiều hơn vào các nguồn hỗ trợ nghiên cứu (Sharafi và cộng sự, 2014). Ngoài ra, nghiên cứu cũng chỉ ra rằng SV thường thiếu động lực tham gia NCKH do chưa được trang bị đầy đủ kiến thức về phương pháp nghiên cứu và chưa có định hướng rõ ràng từ chương trình đào tạo (Mehralizadeh và cộng sự, 2011; Feaali và cộng sự, 2008). Điều này đặc biệt đúng đối với các trường đào tạo ngành Du lịch, nơi mà chương trình học thường tập trung vào lý thuyết và kỹ năng nghề nghiệp hơn là nghiên cứu học thuật (Aggarwal và cộng sự, 2009).

Khu vực Đông Nam Bộ, bao gồm các tỉnh và thành phố như TP. Hồ Chí Minh, Đồng Nai, Bình Dương, Bà Rịa - Vũng Tàu, Tây Ninh và Bình Phước, được xem là trung tâm đào tạo nguồn nhân lực chất lượng cao của cả nước. Ngành Du lịch tại đây đóng vai trò quan trọng trong phát triển kinh tế - xã hội nhờ lợi thế về tài nguyên du lịch phong phú, hạ tầng phát triển và lượng khách du lịch lớn. Do đó, khu vực này đòi hỏi một đội ngũ nhân lực có trình độ chuyên môn cao, khả năng tiếp cận công nghệ mới và tư duy nghiên cứu khoa học. Tuy nhiên, thực tế cho thấy số lượng SV ngành Du lịch tham gia NCKH vẫn còn hạn chế do thiếu kinh nghiệm, kỹ năng nghiên cứu và khó khăn trong việc tiếp cận các nguồn lực cần thiết như tài liệu chuyên ngành, phần mềm phân tích dữ liệu, trang thiết bị thực nghiệm. Bên cạnh đó, nhiều đề tài nghiên cứu của SV chưa gắn kết chặt chẽ với thực tiễn ngành Du lịch tại Đông Nam Bộ, chưa phản ánh đầy đủ những vấn đề cấp thiết cần được giải quyết.

Xuất phát từ thực trạng trên, nghiên cứu này được thực hiện nhằm xác định các yếu tố ảnh hưởng đến hoạt động

NCKH của SV ngành Du lịch tại các trường đại học ở Đông Nam Bộ. Trên cơ sở kết quả nghiên cứu, tác giả đề xuất một số giải pháp nhằm nâng cao hiệu quả NCKH của SV, góp phần nâng cao chất lượng đào tạo và đáp ứng yêu cầu thực tiễn của ngành Du lịch trong khu vực.

2. TỔNG QUAN LÝ THUYẾT

2.1. Khái niệm nghiên cứu khoa học

Theo Luật Khoa học và Công nghệ năm 2013, NCKH được hiểu "là hoạt động khám phá, phát hiện, tìm hiểu bản chất, quy luật của sự vật, hiện tượng tự nhiên, xã hội và tư duy; sáng tạo giải pháp nhằm ứng dụng vào thực tiễn". Theo Vũ Cao Đàm (2005), "NCKH là sự tìm kiếm những điều mà khoa học chưa biết, bao gồm phát hiện bản chất sự vật, phát triển nhận thức khoa học về thế giới, hoặc sáng tạo phương pháp mới và phương tiện kỹ thuật mới để làm biến đổi sự vật, phục vụ cho mục tiêu hoạt động của con người." Định nghĩa này nhấn mạnh mục tiêu cuối cùng của NCKH là tạo ra các giải pháp thực tiễn, đóng góp vào sự phát triển kinh tế, xã hội, và cải thiện chất lượng cuộc sống. Bên cạnh đó, NCKH còn được xem là phương pháp tiếp cận có cấu trúc nhằm trả lời các câu hỏi nghiên cứu, giải quyết vấn đề hoặc kiểm chứng giả thuyết dựa trên các dữ liệu thu thập được thông qua thực nghiệm, quan sát, hoặc phân tích lý thuyết (Aggarwal et al., 2009). Điều này giúp nâng cao năng lực tư duy, sáng tạo và ứng dụng tri thức vào các lĩnh vực cụ thể của con người. Như vậy, Nghiên cứu khoa học (NCKH) là quá trình có hệ thống nhằm khám phá, tìm hiểu và phát triển các kiến thức mới, hoặc kiểm chứng các giả thuyết về bản chất, quy luật của sự vật và hiện tượng trong tự nhiên, xã hội và tư duy.

2.2. Lý thuyết Hành vi có kế hoạch (TPB)

Lý thuyết Hành vi có kế hoạch (TPB) do Icek Ajzen (1991) đề xuất nhằm giải thích và dự đoán hành vi của con người trong các bối cảnh khác nhau. TPB cho rằng ý định thực hiện hành vi (Behavioral Intention) là yếu tố quyết định chính của hành vi và bị ảnh hưởng bởi ba yếu tố chính: Thái độ đối với hành vi; Chuẩn chủ quan; Nhận thức về kiểm soát hành vi

TPB là một khung lý thuyết phù hợp để nghiên cứu các yếu tố ảnh hưởng đến hoạt động NCKH của sinh viên ngành du lịch. Nó giúp xác định các rào cản và động lực thúc đẩy sinh viên tham gia nghiên cứu, từ đó đề xuất các giải pháp nhằm nâng cao chất lượng và số lượng nghiên cứu khoa học trong lĩnh vực du lịch.

2.3. Lý thuyết Động lực tự quyết

Lý thuyết Động lực tự quyết (Self-Determination Theory - SDT), do Deci và Ryan (1985) phát triển, nhấn mạnh vai trò quan trọng của động lực nội tại và động lực bên ngoài trong hành vi của con người. Động lực nội tại, tức là sự yêu thích và đam mê đối với công việc, được coi là yếu tố quan trọng thúc đẩy hành vi bền vững và sáng tạo. Trong khi đó, động lực bên ngoài bao gồm các yếu tố như khen thưởng, sự công nhận, và các áp lực từ môi trường như nhà trường và xã hội, có thể tác động tích cực hoặc tiêu cực đến hành vi của cá nhân. Theo lý thuyết này, ba yếu tố chính ảnh hưởng đến động lực của sinh viên trong hoạt động nghiên cứu khoa học: Nhu cầu về sự tự chủ; Nhu cầu về năng lực; Nhu cầu về sự gắn kết. Lý thuyết SDT được ứng dụng để phân tích các yếu tố ảnh hưởng đến động lực tham gia nghiên cứu khoa học của sinh viên ngành du lịch tại các trường đại học ở Đông Nam Bộ. Cụ thể:

Nhu cầu về sự tự chủ: Nếu sinh viên có thể tự do lựa chọn đề tài nghiên cứu mà họ yêu thích trong lĩnh vực du lịch, đồng thời có thể chọn phương pháp nghiên cứu phù hợp với sở thích và năng lực của bản thân, họ sẽ cảm thấy động lực tham gia nghiên cứu tăng lên. Để cải thiện yếu tố này, các trường đại học có thể tạo ra một môi trường nghiên cứu linh hoạt, nơi sinh viên được khuyến khích chọn đề tài nghiên cứu cá nhân hóa.

Nhu cầu về năng lực: Để thúc đẩy động lực nghiên cứu, các trường đại học cần đảm bảo rằng sinh viên có đủ các kỹ năng cần thiết, chẳng hạn như kỹ năng tìm kiếm tài liệu, phân tích dữ liệu và viết bài nghiên cứu. Các khóa đào tạo, hội thảo và sự hướng dẫn từ giảng viên có thể giúp sinh viên cảm thấy tự tin hơn trong việc tham gia nghiên cứu khoa học.

Nhu cầu về sự gắn kết: Một yếu tố quan trọng không kém là môi trường xã hội trong trường đại học. Mối quan hệ tốt đẹp giữa sinh viên với giảng viên và bạn bè có thể khuyến khích và tạo động lực cho sinh viên tham gia nghiên cứu. Giảng viên đóng vai trò quan trọng trong việc hướng dẫn và tạo động lực, đồng thời môi trường học tập hợp tác và tương tác với bạn bè cũng giúp sinh viên cảm thấy sự gắn kết và động viên trong quá trình nghiên cứu.

Tóm lại, SDT cung cấp một khuôn khổ lý thuyết hữu ích để hiểu rõ hơn về động lực của sinh viên khi tham gia vào hoạt động nghiên cứu khoa học. Việc ứng dụng lý thuyết này sẽ giúp các trường đại học xây dựng môi trường nghiên cứu

phù hợp, từ đó khuyến khích sinh viên ngành du lịch tham gia nghiên cứu khoa học một cách chủ động và hiệu quả.

2.4. Các nghiên cứu liên quan

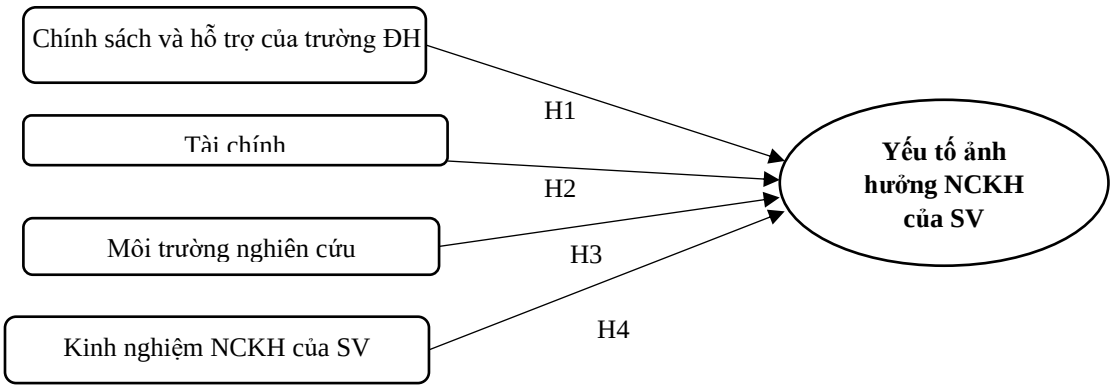
Võ Thị Kim Liên & Trần Thị Thu Hòa (2021): Nghiên cứu tại ĐH Phan Thiết xác định 5 yếu tố chính ảnh hưởng đến động lực NCKH của SV: (1) Nhận thức về NCKH, (2) Năng lực nghiên cứu, (3) Sự quan tâm của khoa, (4) Vai trò hướng dẫn của giảng viên, và (5) Chính sách hỗ trợ của nhà trường.

Hà Đức Sơn & Nông Thị Như Mai (2021): Tại ĐH Tài chính – Marketing, nghiên cứu với 500 mẫu SV cho thấy 4 yếu tố ảnh hưởng lớn: (1) Môi trường nghiên cứu (tác động nhiều nhất), (2) Động cơ, (3) Năng lực SV, và (4) Sự quan tâm khuyến khích của nhà trường.

Opeyemi Mercy Awofeso et al. (2022): Nghiên cứu tại Lagos cho thấy rào cản chính SV y khoa gặp phải gồm: thiếu kinh phí (79,6%), chương trình giảng dạy nghiên cứu yếu (76%), đào tạo phương pháp nghiên cứu chưa đủ (74,7%), thiếu thời gian (73,3%), giám sát và cố vấn hạn chế (58,8%), và thiếu cơ sở vật chất (77,8%).

2.5. Mô hình nghiên cứu

Hình 1. Mô hình nghiên cứu đề xuất



2.6. Các giả thuyết nghiên cứu

Yếu tố "Chính sách và hỗ trợ của trường đại học": đóng vai trò quan trọng trong việc thúc đẩy sinh viên tham gia nghiên cứu khoa học (NCKH) thông qua việc cung cấp quỹ tài chính, cơ sở vật chất hiện đại như phòng thí nghiệm, thư viện, và phần mềm nghiên cứu (Sharafi et al., 2014). Các chính sách khuyến khích như học bổng, hỗ trợ kinh phí, và sự hướng dẫn từ giảng viên góp phần nâng cao kỹ năng nghiên cứu và sự tự tin của sinh viên (Feaali et al., 2008; Aggarwal et al., 2009). Bên cạnh đó, việc xây dựng môi trường học thuật tích cực như câu lạc bộ nghiên cứu, hội thảo khoa học, và cơ hội trình bày kết quả nghiên cứu là các yếu tố then chốt (Hà Đức Sơn & Nông Thị Như Mai, 2021). Tại các trường đại học Đông Nam Bộ, chính sách hỗ trợ minh bạch và dễ tiếp cận có mối tương quan mạnh mẽ với sự tham gia NCKH của sinh viên (Đại học Duy Tân, 2023). Dựa trên thực tiễn, nghiên cứu đặt ra giả thuyết:

H1: "Chính sách và hỗ trợ của trường ĐH có quan hệ cùng chiều với các yếu tố ảnh hưởng tới hoạt động NCKH của SV *khối ngành* DL *các trường Đại học tại* Đông Nam Bộ*"*

Yếu tố "*Tài chính*": là yếu tố cốt lõi thúc đẩy hoạt động nghiên cứu khoa học (NCKH) của sinh viên, giúp đáp ứng nhu cầu như thu thập dữ liệu, sử dụng phần mềm, tham dự hội thảo, và công bố kết quả nghiên cứu (Feaali et al., 2008). Thiếu hụt tài chính hạn chế khả năng tiếp cận nguồn lực và giảm sự tham gia NCKH (Opeyemi Mercy Awofeso et al., 2022). Các chính sách như học bổng, hỗ trợ kinh phí công bố bài báo, và giải thưởng nghiên cứu xuất sắc giúp sinh viên vượt qua rào cản tài chính và tạo động lực tham gia sâu hơn (Sharafi et al., 2014). Hỗ trợ từ nhà trường trong việc tiếp cận quỹ tài trợ bên ngoài cũng đóng vai trò quan trọng (Đại học Duy Tân, 2023). Minh bạch và công bằng trong phân bổ tài chính là yếu tố then chốt khuyến khích sinh viên tham gia NCKH. Dựa trên thực tiễn, nghiên cứu đặt ra giả thuyết:

H2: "Tài chính có quan hệ cùng chiều với các yếu tố ảnh hưởng tới hoạt động NCKH của SV *khối ngành* DL *các trường Đại học tại* Đông Nam Bộ*"*

Yếu tố "*Môi trường nghiên cứu*": Môi trường nghiên cứu được định nghĩa bao gồm các yếu tố hỗ trợ vật chất (phòng thí nghiệm, thiết bị, tài liệu) và tinh thần (hỗ trợ từ giảng viên, cộng đồng học thuật). Một môi trường nghiên cứu

thuận lợi giúp sinh viên tiếp cận tài nguyên, thực hành kỹ năng, và thúc đẩy sáng tạo trong nghiên cứu (Kotrlik et al., 2002; Sharafi et al., 2014). Sự hỗ trợ từ giảng viên và việc tạo dựng một cộng đồng học thuật tích cực đóng vai trò quan trọng trong việc thúc đẩy sinh viên tham gia nghiên cứu. Các hội thảo khoa học, nhóm nghiên cứu hoặc câu lạc bộ học thuật giúp sinh viên nâng cao kỹ năng nghiên cứu, mở rộng mạng lưới chuyên môn và khuyến khích sự phát triển cá nhân (Hà Đức Sơn & Nông Thị Như Mai, 2021). Cơ sở vật chất hiện đại, chẳng hạn như phòng thí nghiệm, thư viện, và các công cụ phân tích, giúp sinh viên thực hiện nghiên cứu một cách hiệu quả hơn. Môi trường nghiên cứu càng phát triển, sinh viên càng có khả năng tiếp cận và tham gia vào các dự án mang tính thực tiễn và đột phá (Entwistle, 2002; Mehralizadeh et al., 2011).

H3: "Môi trường nghiên cứu có quan hệ cùng chiều với các yếu tố ảnh hưởng tới hoạt động NCKH của SV *khối ngành* DL *các trường Đại học tại* Đông Nam Bộ*".*

Yếu tố "*Kinh nghiệm NCKH của SV*": đóng vai trò quan trọng trong việc phát triển kỹ năng như tìm kiếm thông tin, phân tích dữ liệu, viết báo cáo, và trình bày kết quả, giúp sinh viên tự tin và nâng cao năng lực nghiên cứu (Mehralizadeh et al., 2011). Sinh viên có kinh nghiệm thường áp dụng hiệu quả phương pháp nghiên cứu, tăng chất lượng và độ tin cậy của kết quả, đồng thời khuyến khích tham gia các nghiên cứu chuyên sâu (Sharafi et al., 2014). Tham gia dự án thực tế, hội thảo, và các khóa học về phương pháp nghiên cứu giúp sinh viên ngành Du lịch rèn luyện kỹ năng và áp dụng kinh nghiệm vào thực tiễn, đáp ứng nhu cầu thực tế của ngành (Hà Đức Sơn & Nông Thị Như Mai, 2021; Đại học Duy Tân, 2023). Dựa trên các lý thuyết liên quan, nghiên cứu đặt ra giả thuyết:

H4: "Kinh nghiệm NCKH của SV có quan hệ cùng chiều với các yếu tố ảnh hưởng tới hoạt động NCKH của SV *khối ngành* DL *các trường Đại học tại* Đông Nam Bộ"

2.7. Thang đo và biến quan sát của mô hình

Bảng 2. Các nhân tố của thang đo

STT	Ký hiệu	Biến quan sát	Nguồn
1	**Thang đo về chính sách và hỗ trợ của trường ĐH (CS)**		
1.1	CS1	Trường đại học có chương trình đào tạo khuyến khích sinh viên tham gia các hoạt động nghiên cứu khoa học (NCKH)	Sharafi et al. (2014); Feaali et al. (2008)
1.2	CS2	Các cơ sở vật chất (phòng thí nghiệm, thư viện, trang thiết bị) của trường đạp ứng tốt nhu cầu cho hoạt động NCKH của sinh viên	Aggarwal et al. (2009)
1.3	CS3	Trường đại học có chính sách khuyến khích sinh viên tham gia NCKH như học bổng hoặc giải thưởng	Mehralizadeh et al. (2011)
1.4	CS4	Quy trình xét duyệt đề tài NCKH tại trường có minh bạch, nhanh gọn, giúp sinh viên dễ tiếp cận	Feaali et al. (2008)
2	**Thang đo về Tài chính (TC)**		
2.1	TC1	Trường đại học có cung cấp nguồn tài chính hỗ trợ các đề tài NCKH của sinh viên (thu thập dữ liệu, mứn thiết bị, v.v.)	Feaali et al. (2008); Hà Đức Sơn & Nông Thị Như Mai (2021)
2.2	TC2	Có giải thưởng lớn hoặc học bổng cho các đề tài NCKH xuất sắc	Sharafi et al. (2014)
2.3	TC3	Chính sách hỗ trợ tài chính của trường dễ tiếp cận và minh bạch	Opeyemi Mercy Awofeso et al. (2022)
2.4	TC4	Trường có hỗ trợ sinh viên tìm kiếm nguồn tài trợ từ bên ngoài như doanh nghiệp hoặc quỹ nghiên cứu	Hà Đức Sơn & Nông Thị Như Mai, 2021)
3	**Thang đo về môi trường nghiên cứu (MT)**		
3.1	MT1	Giảng viên có hỗ trợ, hướng dẫn sinh viên tham gia các hoạt động NCKH	Hà Đức Sơn & Nông Thị Như Mai (2021)
3.2	MT2	Trường tổ chức nhiều hội thảo, hội nghị khoa học để sinh viên trao đổi và trình bày kết quả nghiên cứu	Kotrlik et al. (2002)
3.3	MT3	Các nhóm nghiên cứu hoặc câu lạc bộ khoa học có được thiết lập và duy trì để sinh viên tham gia	Sharafi et al. (2014)

3.4	MT4	Sinh viên có được tham gia các dự án thực tế hoặc đề tài nghiên cứu liên quan đến doanh nghiệp	Mehralizadeh et al. (2011)
4	**Thang đo về kinh nghiệm NCKH của SV (KN)**		
4.1	KN1	Sinh viên tự tin và đề cao trong việc tìm kiếm, phân tích dữ liệu nghiên cứu	Sharafi et al. (2014); Aggarwal et al. (2009)
4.2	KN2	Sinh viên đã tham gia trình bày kết quả nghiên cứu tại các hội thảo khoa học hoặc các buổi tọa đàm	Hà Đức Sơn & Nông Thị Như Mai (2021)
4.3	KN3	Sinh viên có kỹ năng viết báo cáo nghiên cứu khoa học và công bố kết quả nghiên cứu	Mehralizadeh et al. (2011)
4.4	KN4	Sinh viên có kinh nghiệm làm việc với giảng viên hoặc nhóm nghiên cứu trong các dự án thực tế	(Kotrlik et al., 2002)
5	**Thang đo về Hoạt động NCKH (NCKH)**		
5.1	NCKH1	Tôi thường xuyên tham gia vào các dự án nghiên cứu khoa học tại trường đại học.	(Feaali et al., 2008
5.2	NCKH2	Tôi đã trình bày kết quả nghiên cứu của mình tại các hội thảo hoặc hội nghị khoa học.	Hà Đức Sơn & Nông Thị Như Mai, 2021
5.3	NCKH3	Tôi cảm thấy tự tin khi thực hiện các hoạt động nghiên cứu khoa học.	Aggarwal et al., 2009
5.4	NCKH4	Tôi thường tìm kiếm và sử dụng tài liệu nghiên cứu để phục vụ cho các đề tài của mình	(Kotrlik et al., 2002)

3. PHƯƠNG PHÁP NGHIÊN CỨU

Nghiên cứu này sử dụng phương pháp định lượng để xác định các yếu tố ảnh hưởng đến hoạt động nghiên cứu khoa học (NCKH) của sinh viên ngành Du lịch tại các trường Đại học ở khu vực Đông Nam Bộ. Quy trình nghiên cứu bao gồm: xây dựng thang đo dựa trên cơ sở lý thuyết và các nghiên cứu trước đây, thu thập dữ liệu thông qua bảng khảo sát, và phân tích dữ liệu bằng phần mềm SPSS. Các công cụ phân tích được sử dụng bao gồm Cronbach's Alpha để kiểm tra độ tin cậy, phân tích nhân tố khám phá (EFA) để đánh giá giá trị hội tụ và độ phù hợp của các biến quan sát, cùng với hồi quy tuyến tính bội để xác định mối quan hệ giữa các yếu tố.

Đối tượng nghiên cứu là sinh viên ngành Du lịch đã hoặc đang tham gia các hoạt động NCKH tại các trường Đại học thuộc khu vực Đông Nam Bộ. Mẫu nghiên cứu gồm 300 phiếu khảo sát được phát ra, trong đó 278 phiếu hợp lệ đã được sử dụng để phân tích. Nghiên cứu áp dụng phương pháp lấy mẫu thuận tiện, đảm bảo rằng các sinh viên được khảo sát có kinh nghiệm hoặc hiểu biết về NCKH. Thời gian khảo sát được thực hiện từ tháng 4/2024 đến tháng 6/2024.

Bảng hỏi được thiết kế theo cấu trúc chặt chẽ, dựa trên các thang đo đã kiểm chứng, và chia thành 4 nhóm yếu tố chính: (1) Chính sách và hỗ trợ của trường Đại học, (2) Tài chính, (3) Môi trường nghiên cứu, và (4) Kinh nghiệm NCKH của sinh viên. Dữ liệu thu thập được phân tích bằng SPSS để đảm bảo tính chính xác và tin cậy của kết quả nghiên cứu, cung cấp các kết luận rõ ràng về mối quan hệ giữa các yếu tố độc lập và biến phụ thuộc là mức độ tham gia NCKH của sinh viên.

4. KẾT QUẢ NGHIÊN CỨU

4.1. Mô tả mẫu nghiên cứu

Bảng 1. Mô tả mẫu khảo sát

Biến nhân khẩu học	Phân loại	Mẫu nghiên cứu hợp lệ	
		Số mẫu khảo sát	Tỉ lệ %
Trường học	Đại học Văn Lang	43	15.5
	Đại học Huitech	55	19.8
	Đại học Lạc Hồng	55	19.8
	Đại học Bà Rịa - Vũng Tàu	45	16.2
	Đại học Công nghệ Đồng Nai	34	12.2

	Đại học Sài Gòn	46	16.5
Tổng		**278**	**100.0**
Năm học	Năm 1	25	9.0
	Năm 2	57	20.5
	Năm 3	99	35.6
	Năm 4	97	34.9
Tổng		**278**	**100.0**

Nguồn: Tác giả tổng hợp

4.2. Kết quả kiểm định độ tin cậy của thang đo

Bảng 3. Kết quả kiểm định

Thang đo	Hệ số Cronbach's Alpha	Hệ số tương quan biến tổng
1. Chính sách và hỗ trợ của trường ĐH	0,952	0,908
2. Tài chính	0,976	0,939
3. Môi trường nghiên cứu	0,891	0,906
4. Kinh nghiệm NCKH của SV	0,816	0,866
5. Hoạt động NCKH của SV khối ngành DL các trường Đại học tại Đông Nam Bộ	0,961	

Nguồn: Phần mềm SPSS

Kết quả phân tích (Bảng 3) cho thấy, "các thang đo có độ tin cậy đảm bảo yêu cầu > 0,5 với hệ số Cronbach's Alpha của các nhóm từ 0,816 đến 0,976; hệ số tương quan biến tổng đều > 0,3, cụ thể là dao động từ 0,866 đến 0,939". Tuy nhiên, khi kết quả phân tích Cronbach's Alpha cho thấy có ba nhân tố với hệ số lớn hơn 0,95, điều này có thể chỉ ra một số vấn đề liên quan đến tính độc lập của các biến trong thang đo. Hệ số Cronbach's Alpha cao cho thấy rằng các biến trong nhóm có mối liên hệ chặt chẽ với nhau. Tuy nhiên, cũng có thể dẫn tới tình huống các biến có thể không đủ phân biệt để phản ánh những khía cạnh khác nhau của hoạt động nghiên cứu khoa học. Do đó, tác giả tiếp thực hiện phân tích nhân tố khám phá (EFA) để xác định xem các biến có thể được nhóm lại thành một nhân tố duy nhất hay không. Tóm lại, việc phát hiện ra hệ số Cronbach's Alpha cao là một dấu hiệu cần xem xét kỹ lưỡng để đảm bảo rằng các nhân tố trong mô hình nghiên cứu thực sự độc lập và có tính chính xác.

4.2. Kết quả phân tích EFA

4.2.1. "Phân tích EFA cho nhóm biến độc lập

Bảng 4. Kết quả KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,777
Bartlett's Test of Sphericity	Approx. Chi-Square	5948,656
	df	120
	Sig.	.000

Nguồn: Phần mềm SPSS

Bảng 5. Kết quả phân tích EFA nhân tố

Biến	Hệ số tải nhân tố				
	1	2	3	4	5
TC1	0,924				
TC4	0,918				
TC2	0,913				

TC3	0,901				
CS1		0,917			
CS2		0,904			
CS3		0,903			
CS4		0,901			
MT1			0,895		
MT2			0,895		
MT3			0,805		
MT4			0,655		
KN1				0,823	
KN2				0,804	
KN3				0,720	
KN4				0,628	
NCKH1					0,815
NCKH2					0,802
NCKH3					0,811
NCKH4					0,758

Nguồn: Phần mềm SPSS

Kết quả phân tích "EFA các biến độc lập cho thấy, các biến độc lập có hệ số KMO = 0,777 > 0,5, nên phân tích EFA là phù hợp. Kiểm định Barlett có mức ý nghĩa Sig. = 0,000: Các biến quan sát từ CS1 đến KN4 có tương quan tuyến tính với nhân tố đại diện. Đồng thời, qua phân tích ma trận xoay để kiểm tra (loại) biến xấu của biến quan sát cho thấy, các biến đều có hệ số > 0,5 và sắp xếp theo đúng trật tự của nhân tố đại diện nên sẽ không loại biến" (Bảng 4&5).

4.2.4. Phân tích EFA cho biến phụ thuộc

Bảng 6. Kết quả KMO and Bartlett's Test cho các biến phụ thuộc

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,852
Bartlett's Test of Sphericity	Approx. Chi-Square	1343,956
	df	6
	Sig.	.000

Nguồn: Phần mềm SPSS

Bảng 7. Kết quả EFA cho biến phụ thuộc

Biến quan sát	Hệ số tải nhân tố
	1
F1	0,967
F2	0,949
F3	0,948
F4	0,923

Nguồn: Phần mềm SPSS

Kết quả EFA cho thấy, hệ số KMO = 0,852 > 0,5 và Bartlet có kết quả Sig. = 0,000. Cùng với đó, các thang đo đều có giá trị hệ số tải nhân tố > 0,5, nên cả 4 biến đều đạt yêu cầu về giá trị hội tụ và độ tin cậy (Bảng 6&7).

4.3. Phân tích tương quan

Bảng 8. Ma trận tương quan giữa các nhân tố trong mô hình nghiên cứu

		CSTB	TCTB	MTTB	KNTB	FTB
CSTB	Pearson Correlation	1	.322**	.188**	.438**	.660**
	Sig. (2-tailed)		.000	.002	.000	.000
	N	278	278	278	278	278
TCTB	Pearson Correlation	.322**	1	.521**	.317**	.781**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	278	278	278	278	278
MTTB	Pearson Correlation	.188**	.521**	1	.454**	.756**
	Sig. (2-tailed)	.002	.000		.000	.000
	N	278	278	278	278	278
KNTB	Pearson Correlation	.438**	.317**	.454**	1	.702**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	278	278	278	278	278
FTB	Pearson Correlation	.660**	.781**	.756**	.702**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	278	278	278	278	278

Nguồn: Phần mềm SPSS

Kết quả phân tích tương quan (Bảng 8) cho thấy, "các biến phụ thuộc và các biến độc lập có sự tương quan cao (hệ số tương quan dao động từ 0,188 đến 0,781). Do đó, các biến phụ thuộc sẽ được giải thích bằng các biến độc lập. Ngoài ra, biến độc lập có giá trị Sig. đều > 0,05, nên chấp nhận giả thuyết. Không có hiện tượng phương sai sai số thay đổi trong mô hình, vì hệ số tương quan tổng thể = 0, không có hiện tượng đa cộng tuyến giữa các biến độc lập vì hệ số VIF < 10 (Bảng 9)".

4.4. Phân tích hồi quy bội

Bảng 9. Kết quả phân tích hồi quy

Mô hình		Hệ số hồi quy chưa chuẩn hóa		Hệ số hồi quy chuẩn hóa	t	Sig. Độ chấp nhận	Thống kê đa cộng tuyến	
		B	Sai số chuẩn	Beta			Hệ số phóng đại phương sai	VIF
1	Hằng số	-0,008	0,011		-0,749	0,454		
	Chính sách và hỗ trợ của trường ĐH	0,262	0,003	0,352	104,484	0,000	0,759	1,318
	Tài chính	0,255	0,002	0,395	110,766	0,000	0,676	1,479
	Môi trường nghiên cứu	0,241	0,002	0,368	99,138	0,000	0,625	1,599
	Kinh nghiệm NCKH của SV	0,245	0,003	0,256	71,128	0,000	0,664	1,505

R^2 hiệu chỉnh: 0,998

Thống kê Durbin-Watson: 2,365; Thống kê F(ANOVA): 29027,249

Mức ý nghĩa (Sig. của ANOVA): 0,000

Nguồn: Phần mềm SPSS

Kết quả phân tích (Bảng 9) cho thấy, R2 hiệu chỉnh = 0,998, tương đương 99,8% Hoạt động NCKH của SV khối ngành DL các trường Đại học tại Đông Nam Bộ được quyết định bởi các nhân tố: Chính sách và hỗ trợ của trường ĐH; Tài chính; Môi trường nghiên cứu và Kinh nghiệm NCKH của SV. Ngoài ra, giá trị Sig. của kiểm định F rất nhỏ (Sig. = 0,000), như vậy mô hình đề xuất phù hợp với mẫu khảo sát. Các biến độc lập: Chính sách và hỗ trợ của trường ĐH; Tài chính; Môi trường nghiên cứu và Kinh nghiệm NCKH của SV và biến phụ thuộc Hoạt động NCKH của SV khối ngành DL các trường Đại học tại Đông Nam Bộ đều có Sig. < 0,05, nên về mặt thống kê đều có ý nghĩa. Hệ số Tolerance khá cao từ 0,629 đến 0,747 và hệ số thấp VIF < 2 (từ 1,339 đến 1,590), cho thấy không có hiện tượng đa cộng tuyến giữa các biến độc lập. Dựa vào Bảng 6 ta có mô hình hồi quy như sau:

$$Y= 0,395*TC + 0,368*MT + 0,352*CS + 0,256*KN$$

4.5. Thảo luận

Kết quả phân tích thực nghiệm cho thấy, 4 yếu tố: Chính sách và hỗ trợ của trường ĐH; Tài chính; Môi trường nghiên cứu và kinh nghiệm NCKH của SV có tác động tích cực đến việc NCKH của SV. Trong đó: Tài chính có hệ số Bêta = 0,395 là cao nhất nên nó ảnh hưởng nhiều nhất đến hoạt động NCKH của SV; Môi trường nghiên cứu đứng thứ 2 với hệ số Bêta = 0,368; Chính sách và hỗ trợ của trường ĐH đứng thứ 3 với hệ số Bêta = 0,352 và Kinh nghiệm NCKH của SV đứng thứ 4 với hệ số Bêta = 0,256. Dựa trên kết quả nghiên cứu, nhóm tác giả đề xuất một số giải pháp nhằm nâng cao hiệu quả NCKH của sinh viên khối ngành DL các trường đại học tại Đông Nam Bộ.

5. Kết luận và hàm ý quản trị

5.1. Kết luận

Kết quả nghiên cứu cho thấy các yếu tố: tài chính, môi trường nghiên cứu, chính sách hỗ trợ của trường đại học, và kinh nghiệm NCKH của sinh viên đều tác động tích cực đến hoạt động NCKH của sinh viên ngành du lịch tại các trường đại học Đông Nam Bộ. Trong đó, tài chính là yếu tố ảnh hưởng mạnh nhất, tiếp theo là môi trường nghiên cứu, chính sách hỗ trợ, và cuối cùng là kinh nghiệm NCKH.

Kết quả này tương đồng với các nghiên cứu trước, như Awofeso et al. (2022), nhấn mạnh "thiếu kinh phí" là rào cản lớn, và Hà Đức Sơn & Nông Thị Như Mai (2021), khẳng định vai trò quan trọng của môi trường nghiên cứu. Tuy nhiên, nghiên cứu này đặc biệt nhấn mạnh vai trò của chính sách hỗ trợ, phù hợp với nhận định của Mehralizadeh et al. (2011).

So với Đại học Duy Tân (2023), nghiên cứu này khác biệt khi tập trung vào các yếu tố bên ngoài như tài chính và môi trường, thay vì "khả năng và định hướng nghiên cứu" của sinh viên. Sự khác biệt có thể phản ánh đặc thù ngành du lịch hoặc bối cảnh giáo dục.

Kết quả nghiên cứu cung cấp hàm ý thực tiễn cho việc cải thiện NCKH, đồng thời gợi ý xây dựng chính sách hỗ trợ phù hợp, đặc biệt với ngành du lịch, nơi cần sự gắn kết giữa nghiên cứu và thực tiễn

5.2. Kiến nghị

Một là, để có nguồn tài chính hỗ trợ cho SV tham gia NCKH, các giải pháp có thể được xem xét bao gồm: Thành lập quỹ tài chính chuyên dành cho các đề tài nghiên cứu của SV. Nguồn kinh phí có thể từ ngân sách của nhà trường, các tổ chức, doanh nghiệp tài trợ. Xây dựng quy trình minh bạch và công bằng trong quá trình cấp kinh phí cho các đề tài. Tăng số lượng và giá trị các học bổng dành cho SV nghiên cứu xuất sắc. Tổ chức các cuộc thi, hội thảo khoa học để trao các giải thưởng có giá trị tài chính cho các đề tài nghiên cứu nổi bật. Các học bổng và giải thưởng này có thể do nhà trường, các tổ chức, doanh nghiệp tài trợ. Xây dựng quan hệ hợp tác với các doanh nghiệp trong việc tài trợ, đặt hàng các đề tài nghiên cứu của SV. Doanh nghiệp có thể cung cấp kinh phí, cơ sở vật chất, dữ liệu và hướng dẫn cho các SV nghiên cứu. Có cơ chế chia sẻ lợi ích giữa SV, trường đại học và doanh nghiệp. Tìm kiếm và liên kết với các quỹ NCKH, quỹ đổi mới sáng tạo của chính phủ, các tổ chức phi chính phủ để tài trợ cho nghiên cứu của SV. Hỗ trợ SV viết đề xuất và xin tài trợ từ các quỹ, tổ chức này.

Hai là, để tạo ra một môi trường NCKH tốt cho SV, các giải pháp có thể bao gồm: Đầu tư xây dựng phòng thí nghiệm, phòng máy tính, thư viện hiện đại, đủ tiêu chuẩn cho hoạt động nghiên cứu. Tuyển dụng và đào tạo đội ngũ giảng viên, cán bộ nghiên cứu có chuyên môn sâu, kinh nghiệm nghiên cứu. Khuyến khích và tạo điều kiện để giảng viên tham gia hướng dẫn, đồng hành cùng SV trong các hoạt động nghiên cứu. Xây dựng cơ chế đánh giá, khen thưởng đối với giảng viên có nhiều đóng góp trong hướng dẫn nghiên cứu SV. Thiết kế chương trình đào tạo đa dạng, linh hoạt, tích hợp các hoạt động nghiên cứu từ sớm. Tạo nhiều cơ hội cho SV tham gia vào các dự án, đề tài nghiên cứu thực tế. Tổ chức các hội thảo, cuộc thi NCKH, trình bày kết quả nghiên cứu. Xây dựng mối quan hệ hợp tác với các viện nghiên cứu, phòng thí nghiệm, doanh nghiệp để tạo cơ hội nghiên cứu thực tế cho SV. Tạo điều kiện cho SV tham gia vào các dự án nghiên cứu của các tổ chức này. Huy động sự tham gia, hướng dẫn của các nhà khoa học, chuyên gia từ bên ngoài. Xây dựng văn hóa học thuật, văn hóa NCKH trong trường đại học. Tạo các cơ chế khuyến khích, động viên, khen thưởng đối với SV nghiên cứu xuất sắc. Tổ chức các hoạt động giao lưu, chia sẻ kinh nghiệm nghiên cứu giữa các SV.

Ba là, để thu hút và khuyến khích SV các trường ĐH chuyên ngành DL tại Đông Nam Bộ tham gia vào hoạt động NCKH, thì các chính sách sau có thể được xem xét như: Tăng cường nguồn lực hỗ trợ đặc biệt là nguồn tài chính dành cho nghiên cứu SV (Quỹ hỗ trợ nghiên cứu, học bổng, hoặc tài trợ từ các doanh nghiệp). Cải thiện cơ sở vật chất, trang

thiết bị và phần mềm phục vụ cho hoạt động nghiên cứu; Nâng cao chất lượng đào tạo và hướng dẫn nghiên cứu: Thiết kế các chương trình đào tạo kỹ năng NCKH cho SV, như phương pháp nghiên cứu, phân tích dữ liệu, trình bày kết quả. Tăng cường sự hướng dẫn, hỗ trợ và giám sát của giảng viên đối với các đề tài nghiên cứu của SV; Xây dựng cơ chế khen thưởng, ghi nhận những thành tích nghiên cứu xuất sắc của SV. Tạo cơ hội cho SV tham gia các hội nghị, hội thảo khoa học và được công bố các kết quả nghiên cứu; Thúc đẩy liên kết với thực tiễn: Khuyến khích và tạo điều kiện để SV thực hiện các đề tài nghiên cứu gắn với nhu cầu thực tế của doanh nghiệp, cơ quan. Tăng cường hợp tác giữa các trường đại học và doanh nghiệp, tạo cơ hội cho SV tham gia nghiên cứu ứng dụng.

Bốn là, để trang bị kinh nghiệm nghiên cứu cho SV, các giải pháp có thể bao gồm: Tích hợp các hoạt động nghiên cứu vào chương trình đào tạo thông qua việc thiết kế các học phần, đồ án, khóa luận có yêu cầu SV thực hiện các hoạt động nghiên cứu như xác định vấn đề, xây dựng phương pháp, thu thập và phân tích dữ liệu. Lồng ghép các kỹ năng nghiên cứu như viết đề cương, báo cáo, trình bày kết quả vào các học phần. Tạo cơ hội cho SV tham gia vào các dự án nghiên cứu do các giảng viên, các nhà khoa học chủ trì. Tổ chức các cuộc thi, hội thảo về NCKH dành cho SV. Khuyến khích và hỗ trợ SV tham gia các chương trình nghiên cứu trong và ngoài nước. Xây dựng các hướng dẫn, sách, bài giảng, video về phương pháp, kỹ năng NCKH. Tổ chức các buổi tập huấn, hội thảo chuyên đề về phương pháp nghiên cứu. Tổ chức các buổi bảo vệ, trình bày kết quả nghiên cứu để SV có cơ hội nhận phản hồi. Thiết lập các giải thưởng, chính sách khen thưởng đối với SV nghiên cứu xuất sắc. Trao cơ hội được tham gia các chương trình, dự án nghiên cứu nâng cao cho SV có thành tích tốt. Tạo điều kiện cho SV được công bố, trình bày kết quả nghiên cứu tại các hội thảo, tạp chí khoa học.

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CHÍNH SÁCH GIÁO DỤC SỐ Ở VIỆT NAM : TIẾP CẬN TỪ LÝ THUYẾT CHUYỂN ĐỔI SỐ TRONG GIÁO DỤC (REDECK&PUNIE, 2017)

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TÓM TẮT

Trong bối cảnh chuyển đổi số toàn cầu, giáo dục số đóng vai trò then chốt trong hiện đại hóa hệ thống giáo dục. Việt Nam đã có những bước tiến đáng kể trong việc thúc đẩy giáo dục số, tuy nhiên, việc thực thi chính sách vẫn còn nhiều thách thức. Dựa trên Lý thuyết Chuyển đổi số trong Giáo dục (Redecker & Punie, 2017), nghiên cứu này đánh giá mức độ chuyển đổi số trong giáo dục Việt Nam, so sánh với các quốc gia Đông Nam Á. Báo cáo sử dụng phân tích chính sách (Policy Analysis) để đánh giá các văn bản chính sách của Việt Nam, đồng thời áp dụng phương pháp so sánh (Comparative Analysis) để đối chiếu với mô hình giáo dục số tại Singapore,Malaysia và Thái Lan. Dữ liệu được thu thập từ báo cáo của UNESCO, World Bank, ASEAN Digital Education Reports và Bộ Giáo dục & Đào tạo Việt Nam.

Từ khóa: Chính sách chuyển đổi số trong giáo dục, Lý thuyết chuyển đổi sô trong giáo dục, chuyển đổi số ở Đông Nam Á, chuyển đổi giáo dục sổ Việt Nam.

1. TỔNG QUAN

Chuyển đổi số đang trở thành xu hướng tất yếu trong giáo dục toàn cầu, góp phần nâng cao chất lượng giảng dạy, cá nhân hóa học tập và mở rộng cơ hội tiếp cận tri thức. Nhiều quốc gia Đông Nam Á như Singapore, Indonesia và Thái Lan đã triển khai chính sách giáo dục số một cách toàn diện, kết hợp công nghệ với các mô hình giáo dục tiên tiến để tạo ra hệ sinh thái học tập linh hoạt, hiệu quả. Việt Nam cũng đã có những bước tiến quan trọng trong quá trình này, thể hiện qua các chính sách như Đề án 131 (2023) và Quyết định 749/QĐ-TTg về Chuyển đổi số Quốc gia. Tuy nhiên, việc triển khai vẫn còn gặp nhiều thách thức, đặc biệt là sự thiếu đồng bộ trong khung pháp lý, hạ tầng số chưa hoàn thiện và mức độ tích hợp EdTech vào hệ thống giáo dục chính thống còn hạn chế. Vì vậy, cần có một đánh giá khách quan về mức độ phát triển của chính sách giáo dục số tại Việt Nam, đồng thời đối sánh với các quốc gia Đông Nam Á để đề xuất những điều chỉnh phù hợp.

Để thực hiện mục tiêu này, nghiên cứu áp dụng Lý thuyết Chuyển đổi số trong Giáo dục (Redecker & Punie, 2017) làm khung phân tích chính. Trong các nghiên cứu quốc tế, Lý thuyết Chuyển đổi số trong Giáo dục (Redecker & Punie, 2017) đã được sử dụng để phân tích và đánh giá quá trình áp dụng công nghệ vào hệ thống giáo dục. Dù ra đời trong bối cảnh châu Âu, khung lý thuyết này vẫn có giá trị tham chiếu cho các quốc gia khác, trong đó có Việt Nam. Bài viết kế thừa hướng tiếp cận của Redecker & Punie (2017) để đánh giá chính sách giáo dục số của Việt Nam, đồng thời tiến hành phân tích so sánh với các nước Đông Nam Á là Singapore, Malaysia và Thái Lan. Qua đó, nghiên cứu rút ra những bài học và đề xuất chính sách giúp Việt Nam tiến tới một hệ thống giáo dục số toàn diện hơn. Theo lý thuyết này, quá trình chuyển đổi số trong giáo dục có thể chia thành ba cấp độ: Số hóa (Digitization), Số hóa giảng dạy - học tập (Digitalization), và Chuyển đổi số toàn diện (Digital Transformation). Bằng cách đối chiếu chính sách giáo dục số của Việt Nam với mô hình này, nghiên cứu sẽ xác định Việt Nam đang ở cấp độ nào trong quá trình chuyển đổi số giáo dục, và cần điều chỉnh gì để đạt mức chuyển đổi số toàn diện trong đối sánh với các quốc gia Đông Nam Á.

Xuất phát từ vấn đề trên, nghiên cứu này nhằm trả lời câu hỏi: "Chính sách giáo dục số tại Việt Nam đã phát triển đến mức nào trong quá trình chuyển đổi số giáo dục theo Lý thuyết Redecker & Punie (2017), và Việt Nam cần điều chỉnh gì để đạt mức chuyển đổi số toàn diện trong đối sánh với các quốc gia Đông Nam Á?". Để làm rõ vấn đề này, nghiên cứu sẽ tập trung vào các nội dung sau: Việt Nam đang ở cấp độ nào trong mô hình Redecker & Punie? Các quốc gia như Singapore, Indonesia, Thái Lan đã triển khai chính sách giáo dục số đạt kết quả như thế nào? Việt Nam có thể học hỏi gì từ các nước Đông Nam Á để tối ưu hóa giáo dục số? Những điều chỉnh nào cần thiết để Việt Nam đạt mức chuyển đổi số toàn diện?

Để trả lời những câu hỏi trên, nghiên cứu sử dụng phân tích chính sách (Policy Analysis) nhằm đánh giá các văn bản

chính sách của Việt Nam về giáo dục số, đồng thời áp dụng phương pháp so sánh quốc tế (Comparative Policy Analysis) để đối chiếu với các mô hình giáo dục số của các nước Đông Nam Á. Dữ liệu nghiên cứu được thu thập từ các nguồn đáng tin cậy như báo cáo của UNESCO, World Bank, ASEAN Digital Education Reports và Bộ Giáo dục & Đào tạo Việt Nam.

Báo cáo này được đề cập đến bôn nội dung chính. Phần đầu trình bày cơ sở lý thuyết, trong đó giải thích Lý thuyết Chuyển đổi số trong Giáo dục (Redecker & Punie, 2017). Phần thứ hai là tổng quan về tình hình thực hiện các chính sách giáo dục số tại một số nước Đông Nam Á. Phần thứ ba đánh giá thực trạng chính sách giáo dục số tại Việt Nam theo khung lý thuyết. Dựa trên những kết quả này, phần cuối cùng sẽ đề xuất các điều chỉnh để giúp Việt Nam đạt mức chuyển đổi số toàn diện.

Với cấu trúc trên, bài viết có hai đóng góp chính. Thứ nhất, về mặt học thuật, bài viết vận dụng khung lý thuyết chuyển đổi số trong giáo dục (Redecker & Punie, 2017) và kết hợp hai phương pháp phân tích chính sách (Policy Analysis) và phân tích so sánh (Comparative Analysis) để đánh giá mức độ chuyển đổi số trong giáo dục Việt Nam. Thứ hai, về mặt thực tiễn, bài viết đề xuất một số hàm ý chính sách cụ thể cho Việt Nam, nhằm nâng cao tính khả thi trong triển khai và khắc phục những hạn chế còn tồn tại về hạ tầng, nguồn lực và năng lực thực thi.

2. LÝ THUYẾT VÀ PHƯƠNG PHÁP

Lý thuyết Chuyển đổi số trong Giáo dục do Christine Redecker và Yves Punie đề xuất vào năm 2017, trong báo cáo European Framework for the Digital Competence of Educators do Trung tâm Nghiên cứu Chung (Joint Research Centre - JRC) của Ủy ban Châu Âu phát hành (Redecker, 2017). Báo cáo này ra đời trong bối cảnh Liên minh châu Âu (EU) đẩy mạnh chính sách chuyển đổi số giáo dục, nhằm hướng dẫn các quốc gia thành viên áp dụng công nghệ trong giảng dạy một cách hệ thống và hiệu quả (Redecker & Punie, 2017).

Christine Redecker và Yves Punie đều là những chuyên gia hàng đầu trong lĩnh vực nghiên cứu về chuyển đổi số giáo dục, công nghệ học tập và chính sách giáo dục số. Christine Redecker là nhà nghiên cứu chính tại Joint Research Centre (JRC) của Ủy ban Châu Âu, chuyên về các mô hình năng lực số của giáo viên và học sinh, phát triển các chính sách đổi mới giáo dục dựa trên công nghệ (Redecker, 2017). Yves Punie là chuyên gia nghiên cứu cấp cao tại European Commission's Joint Research Centre, chuyên về các chính sách số hóa giáo dục, công nghệ học tập mở (Open Learning Technologies) và các khung năng lực số cho giáo viên (Punie & Cabrera, 2021).

Lý thuyết này được xây dựng dựa trên các sáng kiến giáo dục số của châu Âu, trong đó nhấn mạnh rằng chuyển đổi số trong giáo dục không chỉ đơn thuần là ứng dụng công nghệ, mà còn phải thay đổi cách thức giảng dạy, quản lý và đánh giá học tập (European Commission, 2018). Báo cáo này đã trở thành nền tảng cho nhiều quốc gia châu Âu trong việc hoạch định chính sách giáo dục số, đồng thời có ảnh hưởng lớn đến các nghiên cứu về EdTech và chuyển đổi số giáo dục trên thế giới.

Lý thuyết Chuyển đổi số đưa ra một khung phân tích để đánh giá mức độ chuyển đổi số trong hệ thống giáo dục. Theo Redecker & Punie (2017), chuyển đổi số trong giáo dục không chỉ đơn thuần là ứng dụng công nghệ vào dạy và học, mà là một quá trình thay đổi mang tính hệ thống, từ nội dung, phương pháp giảng dạy, mô hình quản lý, đến cơ sở hạ tầng. Lý thuyết này đặc biệt nhấn mạnh rằng chỉ khi công nghệ trở thành một phần không thể tách rời của quá trình giáo dục, thì hệ thống giáo dục mới có thể đạt được mức chuyển đổi số toàn diện (Punie & Redecker, 2019).

Lý thuyết Redecker & Punie (2017) phân chia quá trình chuyển đổi số trong giáo dục thành ba cấp độ chính, phản ánh mức độ áp dụng công nghệ và mức độ thay đổi trong mô hình giáo dục:

Số hóa (Digitization)

Đây là giai đoạn đầu tiên của chuyển đổi số, trong đó các nội dung giảng dạy được số hóa nhưng không có sự thay đổi về phương pháp giảng dạy (Redecker, 2017). Các trường học sử dụng tài liệu điện tử thay thế tài liệu giấy, các bài giảng được số hóa dưới dạng file PDF, sách điện tử (e-books), video bài giảng, nhưng cách thức giảng dạy và đánh giá vẫn theo phương pháp truyền thống. Biểu hiện của giai đoạn đầu này là giáo trình điện tử thay thế giáo trình giấy nhưng nội dung giảng dạy vẫn như cũ. Giảng dạy trực tuyến nhưng không thay đổi phương pháp dạy, chỉ đơn thuần là chuyển từ giảng dạy trực tiếp sang giảng dạy qua Zoom hoặc Google Meet. Ở giai đoạn này, công nghệ đóng vai trò hỗ trợ nhưng chưa thực sự thay đổi cách học tập và giảng dạy.

Số hóa giảng dạy - học tập (Digitalization)

Ở cấp độ này, công nghệ không chỉ được sử dụng để lưu trữ tài liệu số, mà còn được tích hợp vào quá trình dạy và học để tạo ra trải nghiệm học tập hiệu quả hơn (Redecker & Punie, 2017). Công nghệ đóng vai trò quan trọng trong học tập kết hợp (Blended Learning), học tập trực tuyến mở (MOOCs - Massive Open Online Courses), sử dụng trí tuệ nhân tạo (AI) để cá nhân hóa bài giảng, hoặc thực tế ảo (VR) để tạo môi trường học tập tương tác. Dễ dàng nhận thấy thành tựu của giai đoạn này là hệ thống quản lý học tập (LMS - Learning Management Systems) như Moodle, Google Classroom giúp quản lý tiến trình học tập; trí tuệ nhân tạo (AI) hỗ trợ đánh giá học sinh, cá nhân hóa bài giảng theo năng lực học tập; ứng dụng thực tế ảo (VR) trong giảng dạy giúp sinh viên y khoa thực hành phẫu thuật mà không cần có bệnh nhân thực tế. Ở cấp độ này, công nghệ bắt đầu thay đổi phương pháp giảng dạy, nhưng vẫn chưa làm thay đổi cấu trúc hệ thống giáo dục.

Chuyển đổi số toàn diện (Digital Transformation)

Đây là mức độ cao nhất của chuyển đổi số, trong đó công nghệ không chỉ hỗ trợ mà còn làm thay đổi hoàn toàn hệ thống giáo dục, từ cách thiết kế chương trình giảng dạy, phương pháp giảng dạy, đến cách đánh giá học tập (Redecker & Punie, 2017). Học tập được cá nhân hóa (Personalized Learning) dựa trên dữ liệu lớn (Big Data) và trí tuệ nhân tạo, giúp xây dựng chương trình học phù hợp với từng cá nhân. Blockchain được sử dụng để xác thực chứng chỉ học tập (Gorini et al., 2019), trong khi Internet vạn vật (IoT) giúp theo dõi tiến trình học tập theo thời gian thực (Punie & Cabrera, 2021). Một số các quốc gia Đông Nam Á đã đạt đến mức độ này như Singapore với Chương trình SkillsFuture sử dụng AI để cá nhân hóa học tập theo nhu cầu từng học sinh (Singapore Ministry of Education, 2022); Thái Lan: Ứng dụng Blockchain vào hệ thống quản lý bằng cấp và chứng chỉ giáo dục (Bangkok Post, 2022). Hay châu Âu đã ứng dụng thực tế ảo (VR) vào đào tạo y khoa, kỹ thuật, khoa học (European EdTech Report, 2023). Như vậy ở giai đoạn này, công nghệ đã tích hợp hoàn toàn vào hệ thống giáo dục, tạo ra một mô hình giáo dục mở, linh hoạt và không giới hạn bởi không gian và thời gian.

Từ khi được giới thiệu vào năm 2017, Lý thuyết Chuyển đổi số trong Giáo dục (Redecker & Punie, 2017) đã trở thành một trong những khung lý thuyết quan trọng nhất trong nghiên cứu về chuyển đổi số giáo dục tại châu Âu và toàn cầu. Lý thuyết này đã được trích dẫn hơn 3.000 lần trong các nghiên cứu học thuật và trở thành một khung phân tích quan trọng trong lĩnh vực giáo dục số toàn cầu (Google Scholar, 2023). Nó đã được tích hợp vào các khung đánh giá chuyển đổi số tại nhiều tổ chức giáo dục quốc tế, bao gồm UNESCO, OECD, World Bank. Lý thuyết này không chỉ được sử dụng để đánh giá mức độ ứng dụng công nghệ trong giáo dục mà còn đóng vai trò định hướng cho nhiều chính sách và nghiên cứu học thuật trong lĩnh vực này.

Theo lý thuyết này, các hệ thống giáo dục hiện nay trên thế giới đang ở các mức độ khác nhau trong quá trình chuyển đổi số. Một số quốc gia tiên tiến như Singapore, Phần Lan, Anh Quốc đã đạt đến Chuyển đổi số toàn diện, trong khi nhiều quốc gia đang phát triển vẫn dừng lại ở giai đoạn Số hóa giảng dạy - học tập (European EdTech Report, 2023).

Để đánh giá chính sách giáo dục số tại Việt Nam, bài viết áp dụng phân tích chính sách (Policy Analysis) thông qua việc rà soát các văn bản quy phạm pháp luật, quyết định của Chính phủ, Bộ Giáo dục và Đào tạo, liên quan đến chuyển đổi số giáo dục giai đoạn 2013-2024 (Nghị quyết 29-NQ/TW, Quyết định 131/QĐ-TTg, Đề án 06...). Phương pháp này cho phép nhận diện mục tiêu, nội dung, công cụ và kết quả thực hiện của chính sách, từ đó làm rõ những điểm mạnh, điểm yếu và thách thức trong triển khai.

Để rút ra bài học cho Việt Nam, nghiên cứu áp dụng Phân tích so sánh (Comparative Analysis) với trường hợp Singapore, Malaysia và Thái Lan. Việc lựa chọn 3 quốc gia này xuất phát từ đặc điểm: (i) Singapore đại diện cho nhóm quốc gia phát triển cao, đã đạt cấp độ chuyển đổi số giáo dục tiên tiến; (ii) Malaysia là quốc gia có chính sách giáo dục số tiến bộ nhưng vẫn đang hoàn thiện hạ tầng; (iii) Thái Lan có tốc độ chuyển đổi số nhanh, tuy nhiên gặp nhiều vấn đề tương đồng về hạ tầng và năng lực như Việt Nam. Dữ liệu thứ cấp được thu thập từ các báo cáo của UNESCO, World Bank, ASEAN Digital Education Reports và tài liệu chính thức của chính phủ các nước. Thông qua đối chiếu, nghiên cứu phân tích mức độ tương đồng và khác biệt, đồng thời đánh giá tính áp dụng của kinh nghiệm quốc tế vào bối cảnh Việt Nam.

3. KẾT QUẢ VÀ THẢO LUẬN

Hiệp hội các quốc gia Đông Nam Á (ASEAN) bao gồm 10 quốc gia thành viên, mỗi nước có đặc điểm kinh tế, xã

hội và giáo dục khác nhau. Mặc dù tất cả các nước ASEAN đều đã và đang thực hiện các chính sách chuyển đổi số trong giáo dục, nhưng mức độ phát triển và chiến lược triển khai có sự khác biệt đáng kể. Do đó, nghiên cứu này chỉ tập trung phân tích ba quốc gia tiêu biểu: Singapore, Malaysia và Thái Lan. Đây là những quốc gia tiên phong trong chính sách giáo dục số. Singapore và Malaysia là những quốc gia đi đầu trong việc áp dụng công nghệ vào giáo dục, với các chương trình như SkillsFuture (Singapore Ministry of Education, 2022) và MyDigital Education Blueprint (Malaysian Ministry of Education, 2021). Thái Lan là quốc gia ASEAN đầu tiên ứng dụng blockchain vào quản lý bằng cấp giáo dục (Bangkok Post, 2022. Các quốc gia này cũng đại diện cho các mô hình phát triển khác nhau. Nếu như Singapore đại diện cho nhóm quốc gia phát triển cao, có chính sách giáo dục số toàn diện, thì Malaysia đại diện cho nhóm quốc gia đang phát triển, có chính sách giáo dục số nhưng chưa đồng bộ như Singapore. Thái Lan là đại diện cho nhóm quốc gia có tốc độ tăng trưởng nhanh trong giáo dục số nhưng vẫn gặp nhiều thách thức về hạ tầng và triển khai. Việc lựa chọn những quốc gia này có chủ ý đối sánh mức độ tác động và bài học thực tiễn đối với Việt Nam. Như Singapore có thể cung cấp bài học về học tập cá nhân hóa và AI trong giáo dục, Thái Lan có thể giúp Việt Nam nghiên cứu về ứng dụng blockchain trong giáo dục, Malaysia có thể giúp Việt Nam trong phát triển hạ tầng số và kỹ năng số cho giáo viên, học sinh.

Singapore là quốc gia có chính sách giáo dục số toàn diện và tiên tiến nhất Đông Nam Á, tập trung vào việc cá nhân hóa học tập và ứng dụng trí tuệ nhân tạo (AI) để nâng cao chất lượng giảng dạy. Chính phủ Singapore coi chuyển đổi số giáo dục là một phần của chiến lược quốc gia Smart Nation nhằm thúc đẩy công nghệ trong mọi lĩnh vực, bao gồm giáo dục (Singapore Ministry of Education, 2019).

Chính sách đầu tiên là SkillsFuture (2015 - nay)

Học tập suốt đời và đào tạo kỹ năng số. SkillsFuture là chương trình trọng điểm của Singapore nhằm hỗ trợ tài chính cho công dân học tập suốt đời, đồng thời phát triển kỹ năng số và công nghệ cho lực lượng lao động. Chính sách này hướng đến học tập linh hoạt, cho phép cá nhân lựa chọn chương trình đào tạo phù hợp với nhu cầu nghề nghiệp trong thời đại số (Singapore SkillsFuture Council, 2022). Các nội dung chính của SkillsFuture: Hỗ trợ tài chính. Mỗi công dân Singapore trên 25 tuổi nhận 500 SGD tín dụng đào tạo, có thể sử dụng để đăng ký các khóa học trực tuyến hoặc trực tiếp trong danh mục của SkillsFuture (SkillsFuture Singapore, 2023). Phát triển kỹ năng số. Chương trình bao gồm các khóa học về AI, lập trình, phân tích dữ liệu, an ninh mạng, giúp người học nâng cao năng lực số. Hợp tác với doanh nghiệp. Chính phủ hợp tác với các công ty công nghệ như Microsoft, IBM, Google để cung cấp nội dung đào tạo và chứng chỉ nghề nghiệp quốc tế. Mở rộng nền tảng học tập. SkillsFuture phối hợp với các nền tảng EdTech như Udemy, Coursera, LinkedIn Learning để cung cấp các khóa học trực tuyến chất lượng cao Chính sách SkillsFuture đã đem lại kết quả hơn 560.000 người Singapore đã tham gia khóa học trên nền tảng SkillsFuture từ 2015-2023 (SkillsFuture Singapore, 2023); 92% người học cho biết kỹ năng được đào tạo giúp họ tăng cơ hội việc làm trong nền kinh tế số (Singapore Workforce Development Agency, 2022). SkillsFuture được OECD (Organisation for Economic Co-operation and Development) đánh giá là một trong những chương trình đào tạo kỹ năng số hiệu quả nhất thế giới (OECD, 2023).

Chính sách thứ hai là EdTech Plan (2019 - 2025)

Tích hợp AI vào giáo dục và phát triển nền tảng học tập số. Chính phủ Singapore đã đưa ra Kế hoạch Công nghệ Giáo dục (EdTech Plan) giai đoạn 2019 - 2025, tập trung vào ứng dụng AI, dữ liệu lớn (Big Data) và học tập cá nhân hóa để tối ưu hóa giáo dục (Singapore Ministry of Education, 2019). Các nội dung chính của EdTech Plan bao gồm: Triển khai AI trong giảng dạy. AI được sử dụng để cá nhân hóa nội dung học tập, theo dõi tiến trình học tập của từng học sinh và đề xuất lộ trình học phù hợp. Phát triển nền tảng Singapore Student Learning Space (SLS), một hệ thống học tập trực tuyến dành cho toàn bộ học sinh Singapore, cung cấp tài liệu học tập số và công cụ tự học. Ứng dụng dữ liệu lớn (Big Data): Hệ thống SLS thu thập dữ liệu học tập để đánh giá hiệu suất học sinh theo thời gian thực, giúp giáo viên điều chỉnh phương pháp giảng dạy. Hỗ trợ giáo viên phát triển kỹ năng số. Giáo viên được đào tạo về công nghệ giáo dục, phương pháp giảng dạy trực tuyến và ứng dụng AI trong đánh giá học tập. Với chính sách này, hơn 90% học sinh Singapore sử dụng nền tảng SLS trong học tập hàng ngày (Singapore Ministry of Education, 2022), giáo viên giảm 30% thời gian chấm bài nhờ ứng dụng AI (Singapore EdTech Report, 2023), Singapore được OECD xếp hạng thứ 2 châu Á về chuyển đổi số giáo dục (OECD, 2023).

Chính sách thứ ba nhằm hướng đến Hợp tác công - tư (Public-Private Partnership - PPP)), thúc đẩy EdTech phát triển.

Chính phủ Singapore khuyến khích hợp tác công - tư để phát triển hệ sinh thái EdTech, tạo điều kiện cho doanh nghiệp công nghệ giáo dục cung cấp dịch vụ hỗ trợ học tập cá nhân hóa. Chính phủ hợp tác với startup EdTech, các công ty như KooBits, Geniebook, Cerebry nhận được tài trợ để phát triển AI hỗ trợ học sinh tự học. Hỗ trợ tài chính cho doanh nghiệp EdTech bằng cách chính phủ thành lập quỹ EdTech Innovation Fund với ngân sách 50 triệu SGD để hỗ trợ phát triển công nghệ giáo dục mới (Singapore Economic Development Board, 2022). Hợp tác với các tập đoàn công nghệ lớn: Singapore ký thỏa thuận hợp tác với Google, Microsoft, IBM để cung cấp nội dung học tập và công nghệ hỗ trợ giáo dục. Với chính sách này hơn 200 startup EdTech tại Singapore nhận được tài trợ để phát triển công nghệ giáo dục (Singapore Startup Report, 2023). Geniebook - một startup EdTech sử dụng AI để cá nhân hóa giáo dục, đã thu hút hơn 20 triệu USD vốn đầu tư (Tech in Asia, 2023).

Đến cuối năm 2024, Singapore tiếp tục khẳng định vị thế tiên phong trong lĩnh vực chuyển đổi số giáo dục, được ghi nhận bởi các tổ chức quốc tế thông qua những kết quả sau:

Phát triển thị trường E-Learning.

Theo báo cáo của IMARC Group, thị trường e-learning của Singapore đạt giá trị 1,3 tỷ USD vào năm 2024 và dự kiến sẽ tăng trưởng với tốc độ CAGR 13,70% trong giai đoạn 2025-2033, đạt 4,2 tỷ USD vào năm 2033. Sự tăng trưởng này được thúc đẩy bởi các sáng kiến mạnh mẽ của chính phủ trong giáo dục số, tỷ lệ thâm nhập internet cao và nhu cầu nâng cao kỹ năng số trong lực lượng lao động.

Đầu tư vào trí tuệ nhân tạo (AI).

Singapore được xem là quốc gia dẫn đầu trong việc áp dụng AI, với dự kiến chi tiêu 4,2 tỷ USD vào năm 2027 cho hạ tầng và ứng dụng AI. Chính phủ đã công bố khoản đầu tư 743 triệu SGD (khoảng 568 triệu USD) trong 5 năm tới để nâng cao năng lực AI quốc gia, phát triển hệ sinh thái AI đáng tin cậy và đảm bảo triển khai an toàn Chiến lược AI Quốc gia 2.0.

Thực hiện EdTech Masterplan 2030.

Bộ Giáo dục Singapore đã triển khai "Kế hoạch Chuyển đổi Giáo dục thông qua Công nghệ" đến năm 2030, tập trung vào việc cá nhân hóa học tập, nâng cao kỹ năng số cho giáo viên và phát triển môi trường học tập linh hoạt. Kế hoạch này nhằm trang bị cho học sinh trở thành những người học chủ động, sẵn sàng cho tương lai trong một thế giới được chuyển đổi bởi công nghệ

Malaysia đã có những bước tiến quan trọng trong quá trình chuyển đổi số giáo dục, tập trung vào nâng cao năng lực số, phát triển hạ tầng công nghệ, và mở rộng khả năng tiếp cận giáo dục kỹ thuật số cho học sinh trên toàn quốc. Các chính sách giáo dục số của Malaysia được triển khai theo lộ trình dài hạn, với sự tham gia tích cực của Bộ Giáo dục Malaysia (MOE), Bộ Khoa học, Công nghệ và Đổi mới (MOSTI), và các đối tác trong và ngoài nước.

Bước đầu tiên chương trình "Lớp học thông minh" (Smart Classroom Initiative). Chương trình được triển khai thí điểm vào năm 2018 tại Đại học Tun Hussein Onn Malaysia (UTHM), nhằm thúc đẩy chuyển đổi lớp học truyền thống sang môi trường học tập số hóa. Mô hình này sau đó được mở rộng ra toàn quốc với sự tài trợ của Bộ Giáo dục Malaysia và Quỹ Đổi mới Giáo dục Malaysia (MEIF) (UTHM News, 2018). Nội dung của chương trình được triển khai từ mục tiêu của chính sách nhằm Tích hợp công nghệ hiện đại trong lớp học bằng hoàng động các trường được trang bị máy chiếu tương tác, bảng điện tử, máy tính bảng và hệ thống quản lý học tập (LMS) để hỗ trợ giảng dạy trực tuyến. Quan trọng hơn là Hợp tác công – tư khi Chính phủ hợp tác với Google, Apple, Samsung và Microsoft để phát triển các giải pháp lớp học thông minh phù hợp với chương trình giáo dục Malaysia. Song song với đó là Đào tạo giáo viên về phương pháp giảng dạy số. Bộ Giáo dục tổ chức các khóa đào tạo đặc biệt về ứng dụng công nghệ trong giảng dạy cho hơn 200.000 giáo viên trên toàn quốc. Đến năm 2023, hơn 1.200 trường học trên toàn quốc đã áp dụng mô hình lớp học thông minh (Education Malaysia Global Services, 2024); Sự tương tác trong lớp học được cải thiện khi 80% học sinh tham gia chương trình lớp học thông minh cho biết họ tích cực hơn trong quá trình học tập so với phương pháp truyền thống (UNESCO, 2024), 90% giáo viên được đào tạo về công nghệ giáo dục đã áp dụng các phương pháp giảng dạy số trong lớp học (World Bank, 2024).

Chính sách quan trọng thứ hai là Tài nguyên Giáo dục Mở Toàn diện (Inclusive Open Educational Resources - OER Policy). Chính sách Inclusive OER Policy được thông qua vào ngày 9 tháng 12 năm 2021, đưa Malaysia trở thành quốc gia đầu tiên ở Đông Nam Á áp dụng chính sách tài nguyên giáo dục mở toàn diện (UNESCO, 2022). Nội dung chính sách là Tạo kho tài nguyên học tập số miễn phí, cho phép giáo viên và học sinh truy cập tài liệu học tập số mà không cần trả phí; Đảm bảo tính toàn diện,đặc biệt tập trung vào học sinh thuộc các nhóm dễ bị tổn thương, giúp giảm bất bình đẳng trong giáo dục. Từ chính sách này, Malaysia đã tăng cường hợp tác quốc tế, hợp tác với UNESCO và World Bank để xây dựng hệ thống tài nguyên mở (UNESCO, 2022), cung cấp tài nguyên học tập miễn phí với hơn 10.000 tài liệu giáo dục số đã được phát hành miễn phí trên hệ thống OER Malaysia.

Nổi bật nhất là Chính sách Giáo dục Kỹ thuật số Quốc gia (National Digital Education Policy - DED) được Nội các Malaysia phê duyệt vào ngày 11 tháng 7 năm 2023, nhằm thúc đẩy học tập và giảng dạy số hóa trong hệ thống giáo dục quốc gia. Chính sách này là một phần quan trọng trong chiến lược Malaysia Digital Economy Blueprint (MyDIGITAL), hướng đến mục tiêu biến Malaysia thành một nền kinh tế kỹ thuật số toàn diện vào năm 2030 (Ministry of Communications and Digital Malaysia, 2023). Những mục tiêu số hóa trong giáo dục được xác định rõ là Phát triển năng lực số trong giáo dục, đảm bảo học sinh và giáo viên có thể sử dụng thành thạo các công nghệ mới; Nâng cấp hạ tầng công nghệ số, bao gồm kết nối internet tốc độ cao, trang thiết bị số và nền tảng học tập trực tuyến; Phát triển nội dung số chất lượng cao, giúp học sinh tiếp cận giáo trình số hóa toàn diện. DED đặt trọng tâm vào bốn lĩnh vực chính để hiện thực hóa giáo dục số tại Malaysia gồm:

Hạ tầng số hóa trong giáo dục.

Chính phủ Malaysia đã cam kết triển khai internet tốc độ cao cho 100% trường học trên toàn quốc vào năm 2025, trong đó các vùng nông thôn và hải đảo được ưu tiên (Komunikasi Malaysia, 2023);

Ứng dụng trí tuệ nhân tạo (AI) và dữ liệu lớn (Big Data) trong giáo dục.

DED đặt mục tiêu tích hợp AI vào chương trình giảng dạy và hệ thống đánh giá học tập để cá nhân hóa việc học cho từng học sinh;

Nâng cao năng lực số cho giáo viên.

Bộ Giáo dục Malaysia đã hợp tác với Google for Education và Microsoft Malaysia để cung cấp các chương trình đào tạo kỹ năng số cho hơn 500.000 giáo viên trên toàn quốc.

Phát triển nền tảng giáo dục số.

Malaysia đã ra mắt DELIMa (Digital Educational Learning Initiative Malaysia), nền tảng giáo dục số chính thức của chính phủ, nơi giáo viên và học sinh có thể truy cập tài liệu học tập số, tham gia lớp học trực tuyến và kiểm tra trực tuyến. Đến cuối năm 2023, hơn 90% trường học Malaysia đã kết nối internet tốc độ cao, tạo điều kiện cho giáo viên và học sinh tiếp cận giáo dục số (UNESCO, 2023), tăng cường khả năng tiếp cận học tập trực tuyến; 75% giáo viên tại Malaysia đã hoàn thành chương trình đào tạo về giảng dạy trực tuyến và công nghệ giáo dục (World Bank, 2024), mở rộng chương trình đào tạo giáo viên về công nghệ số; Phát triển nền tảng giáo dục số khi DELIMa đã có hơn 5 triệu học sinh và 500.000 giáo viên sử dụng thường xuyên (MyEdvolution, 2024).

Vương quốc Thái Lan đã triển khai một loạt chính sách giáo dục số nhằm hiện đại hóa hệ thống giáo dục và nâng cao chất lượng dạy và học thông qua ứng dụng công nghệ thông tin. Các chính sách đã thực hiện bao gồm:

Chính sách "Học tập từ xa qua truyền hình" (Distance Learning via Television - DLTV).

Chính sách "Học tập từ xa qua truyền hình" (Distance Learning via Television - DLTV) ở Thái Lan được khởi xướng vào năm 1996. DLTV phát sóng 15 kênh giáo dục từ Trường Klai Kangwon Palace ở Hua Hin, thông qua vệ tinh Thaicom 5, nhằm cung cấp giáo dục cho hơn 17.000 trường học và các thuê bao khác trên toàn quốc. Mục tiêu ban đầu của DLTV là thu hẹp khoảng cách giáo dục cho trẻ em thiệt thòi ở các khu vực nông thôn và vùng sâu vùng xa, đảm bảo rằng mọi học sinh đều có cơ hội tiếp cận giáo dục chất lượng. Trong bối cảnh đại dịch COVID-19 vào năm 2020, DLTV đã mở rộng phạm vi và tầm quan trọng của mình. Vào ngày 13 tháng 5 năm 2020, Ủy ban Phát thanh và Truyền hình Quốc gia (NBTC) đã phê duyệt việc sắp xếp 17 kênh truyền hình kỹ thuật số mới dành cho giáo dục, từ kênh 37 đến 53, do Bộ Giáo dục quản lý. Những kênh này bắt đầu phát sóng tạm thời từ ngày 1 tháng 7 năm 2020 trong vòng sáu tháng, nhằm hỗ trợ học tập từ xa cho học sinh trong thời gian trường học đóng cửa. Việc triển khai DLTV đã giúp Thái Lan duy trì

liên tục quá trình giáo dục, đặc biệt trong các tình huống khẩn cấp như đại dịch, đồng thời cung cấp tài nguyên học tập cho học sinh ở mọi vùng miền trên cả nước. Những kết quả đã thực hiện được của chính sách này. Phát sóng bài giảng: Sử dụng 15 kênh truyền hình để phát sóng các bài giảng từ Trường Klai Kangwon Palace, Hua Hin, đến hơn 17.000 trường học và người xem khác trên toàn quốc. Hợp tác công tư: Hợp tác với các công ty truyền thông để đảm bảo việc phát sóng liên tục và chất lượng cao. DLTV "phát sóng 15 kênh giáo dục từ Trường Klai Kangwon Palace, Hua Hin, đến 17.000 trường học và các thuê bao khác trên toàn quốc. Chương trình DLTV đã tăng cường tiếp cận giáo dục ở vùng sâu vùng xa, giúp học sinh ở các khu vực nông thôn và vùng sâu vùng xa tiếp cận giáo dục chất lượng, giảm thiểu khoảng cách giáo dục giữa các vùng miền.

" Dự án 500 lớp học số" (1,500 Digital Classrooms)

Được khởi xướng vào tháng 12 năm 2023. Mục tiêu của dự án là thiết lập 1.500 lớp học số trên toàn quốc để đào tạo ít nhất 100.000 nhân tài số mỗi năm, đáp ứng nhu cầu ngày càng tăng về nhân lực công nghệ. Bộ trưởng Bộ Kinh tế và Xã hội Số (DES), ông Prasert Jantararuangtong, đã nhấn mạnh tầm quan trọng của dự án này trong việc phát triển nguồn nhân lực số của Thái Lan. Dự án này hướng đến

– Trang bị công nghệ với nhiệm vụ cung cấp các công cụ cần thiết, như máy tính và phần mềm, được thiết kế để giảng dạy kỹ năng lập trình cho học sinh.

– Hợp tác đa ngành nhằm phối hợp giữa Bộ Kinh tế và Xã hội Số (DES) với các cơ sở giáo dục để triển khai dự án một cách hiệu quả. Việc thiết lập 1.500 lớp học số đã phát triển hạ tầng giáo dục số,tạo điều kiện cho hàng trăm nghìn học sinh tiếp cận với công nghệ hiện đại, nâng cao kỹ năng số và sẵn sàng cho thị trường lao động tương lai.

Chính sách " Giáo dục Đại học Số" (Digital Higher Education)

Với mục tiêu thúc đẩy phát triển giáo dục đại học số, nơi người học có thể truy cập thông tin và nội dung học thuật từ các cơ sở dữ liệu và nguồn học tập trực tuyến. Chính sách "Giáo dục Đại học Số" (Digital Higher Education) của Thái Lan được chính thức khởi động vào ngày 16 tháng 9 năm 2024, khi Bộ trưởng Bộ Giáo dục công bố Chính sách Giáo dục cho năm tài chính 2025-2026. Chính sách này tập trung vào việc phát triển hệ thống giáo dục linh hoạt, bao gồm giáo dục chính quy, không chính quy và phi chính quy, được hỗ trợ bởi công nghệ hiện đại. Mục tiêu là đáp ứng tiềm năng của người học, giảm bớt gánh nặng và bất bình đẳng trong tiếp cận giáo dục chất lượng, đồng thời thúc đẩy học tập suốt đời. Trước đó, vào tháng 5 năm 2019, Thái Lan đã thành lập Bộ Giáo dục Đại học, Khoa học, Nghiên cứu và Đổi mới (MHESI), phản ánh tầm quan trọng của nghiên cứu trong giáo dục đại học và sự cần thiết của việc tích hợp nghiên cứu với các cơ sở giáo dục để thúc đẩy đổi mới và phát triển công nghệ. Những bước đi này cho thấy cam kết của Thái Lan trong việc hiện đại hóa giáo dục đại học thông qua ứng dụng công nghệ số, nhằm nâng cao chất lượng giáo dục và đáp ứng nhu cầu ngày càng tăng về nhân lực có kỹ năng cao trong kỷ nguyên số. Trọng tâm của chính sách này bao gồm: Phát triển hạ tầng số: Xây dựng cơ sở hạ tầng công nghệ thông tin mạnh mẽ để hỗ trợ học tập trực tuyến. Tăng cường khả năng tiếp cận, đảm bảo rằng sinh viên trên khắp cả nước có thể tiếp cận các tài nguyên học tập số một cách dễ dàng. Kế hoạch Giáo dục Đại học 2023-2027 của Thái Lan đặt mục tiêu "thúc đẩy phát triển Giáo dục Đại học Số, nơi người học có thể truy cập thông tin và nội dung học thuật từ các cơ sở dữ liệu và nguồn học tập trực tuyến. Chính sách "Giáo dục Đại học Số" đã mở rộng khả năng tiếp cận tài nguyên học thuật cho sinh viên, giúp họ học tập linh hoạt và hiệu quả hơn, cải thiện chất lượng giáo dục đại học.

Những chính sách và kết quả trên cho thấy Thái Lan đang nỗ lực mạnh mẽ trong việc chuyển đổi số giáo dục, tập trung vào phát triển hạ tầng công nghệ, cải cách chương trình giảng dạy và hỗ trợ học sinh, nhằm nâng cao chất lượng giáo dục và đáp ứng nhu cầu của nền kinh tế số.

Để đánh giá mức độ chuyển đổi số trong giáo dục của ba quốc gia Đông Nam Á: Singapore, Malaysia và Thái Lan, chúng ta sẽ áp dụng Lý thuyết Chuyển đổi Số trong Giáo dục. Như đã nêu trên, lý thuyết này phân chia quá trình chuyển đổi số thành ba cấp độ chính:

Khởi đầu (Emerging): tập trung vào việc cung cấp cơ sở hạ tầng công nghệ cơ bản và đào tạo kỹ năng số cơ bản cho giáo viên và học sinh.

Cấp độ Phát triển (Developing): tích hợp công nghệ vào quá trình giảng dạy và học tập, phát triển nội dung số và áp

dụng các phương pháp sư phạm mới.

Và cao nhất cấp độ Tiên tiến (Advanced): sử dụng công nghệ để đổi mới toàn diện hệ thống giáo dục, bao gồm quản lý, đánh giá và tạo ra môi trường học tập linh hoạt, cá nhân hóa.

Với các tiêu chí của Lý thuyết Chuyển đổi số trong giáo dục, Singapore được xem là quốc gia tiên phong trong việc áp dụng công nghệ vào giáo dục. Chính phủ đã triển khai nhiều sáng kiến như Kế hoạch Công nghệ Giáo dục (EdTech Plan) và Nền tảng Học tập Trực tuyến Quốc gia (SLS), nhằm tích hợp công nghệ sâu rộng vào quá trình giảng dạy và học tập. Hệ thống giáo dục của Singapore không chỉ tập trung vào hạ tầng công nghệ mà còn chú trọng đến việc phát triển nội dung số chất lượng cao và đào tạo giáo viên về phương pháp sư phạm số. Điều này cho phép cá nhân hóa học tập và tạo ra môi trường học tập linh hoạt. Vậy nên Singapore đạt Cấp độ Tiên tiến trong chuyển đổi số giáo dục.

Với Malaysia, quốc gia này đã thực hiện nhiều chính sách để thúc đẩy chuyển đổi số trong giáo dục, như Chính sách Giáo dục Kỹ thuật số Quốc gia (DED) và chương trình DELIMa. Các sáng kiến này tập trung vào việc nâng cấp hạ tầng công nghệ, phát triển nội dung số và đào tạo kỹ năng số cho giáo viên và học sinh. Tuy nhiên, việc triển khai còn gặp một số thách thức, đặc biệt là trong việc đảm bảo tất cả các trường học, đặc biệt ở vùng nông thôn, đều có kết nối internet ổn định và tiếp cận được với công nghệ hiện đại. Như vậy Malaysia đang ở Cấp độ Phát triển trong chuyển đổi số giáo dục.

Cuối cùng là Thái Lan. Họ đã đạt được những bước đầu trong việc áp dụng công nghệ vào giáo dục, với các chương trình như "Lớp học thông minh" và "Học tập từ xa qua truyền hình (DLTV)". Mặc dù đã có những nỗ lực đáng kể, nhưng việc triển khai còn chưa đồng bộ và gặp nhiều khó khăn, đặc biệt là về hạ tầng công nghệ và đào tạo giáo viên. Nhiều trường học, đặc biệt ở các khu vực nông thôn, vẫn thiếu thiết bị và kết nối internet cần thiết để hỗ trợ học tập số. Do đó Thái Lan chỉ đạt được ở Cấp độ Khởi đầu trong chuyển đổi số giáo dục.

Tiêu chí	Singapore	Malaysia	Thái Lan
Hạ tầng công nghệ	Tiên tiến	Phát triển	Khởi đầu
Đào tạo kỹ năng số cho giáo viên	Tiên tiến	Phát triển	Khởi đầu
Phát triển nội dung số	Tiên tiến	Phát triển	Khởi đầu
Tích hợp công nghệ vào giảng dạy	Tiên tiến	Phát triển	Khởi đầu
Đổi mới quản lý giáo dục	Tiên tiến	Phát triển	Khởi đầu

4. ĐÁNH GIÁ THỰC TRẠNG CHÍNH SÁCH GIÁO DỤC SỐ TẠI VIỆT NAM THEO KHUNG LÝ THUYẾT

4.1 Chính sách chuyển đổi số trong giáo dục tại Việt Nam: Lộ trình và kết quả thực hiện

Việt Nam đã triển khai một loạt chính sách quan trọng nhằm thúc đẩy chuyển đổi số trong giáo dục, hướng đến việc hiện đại hóa hệ thống quản lý giáo dục, nâng cao chất lượng giảng dạy, và tạo điều kiện cho học sinh tiếp cận các phương pháp học tập tiên tiến. Các chính sách này tập trung vào phát triển hạ tầng công nghệ thông tin, xây dựng cơ sở dữ liệu ngành giáo dục, đào tạo kỹ năng số cho giáo viên và học sinh, đồng thời ứng dụng công nghệ vào quản lý giáo dục và giảng dạy.

4.2 Lộ trình chính sách và văn bản pháp lý về chuyển đổi số giáo dục tại Việt Nam

Việt Nam bắt đầu quan tâm đến chuyển đổi số trong giáo dục từ năm 2013, khi Nghị quyết số 29-NQ/TW của Ban Chấp hành Trung ương Đảng đặt ra chủ trương "đẩy mạnh ứng dụng công nghệ thông tin và truyền thông trong dạy và học" (Ban Chấp hành Trung ương Đảng, 2013). Đây được xem là bước đầu tiên định hướng cho quá trình ứng dụng công nghệ vào giáo dục và xây dựng nền tảng để phát triển các chính sách sau này.

Bước ngoặt quan trọng trong lộ trình chuyển đổi số của giáo dục Việt Nam là việc ban hành Quyết định số 131/QĐ-TTg ngày 25/01/2022 của Thủ tướng Chính phủ, phê duyệt Đề án "Tăng cường ứng dụng công nghệ thông tin và chuyển đổi số trong giáo dục và đào tạo giai đoạn 2022-2025, định hướng đến năm 2030". Đề án này đặt ra các mục tiêu chính: (1) hoàn thiện hạ tầng công nghệ thông tin trong giáo dục, (2) phát triển hệ sinh thái học tập số, (3) triển khai học tập trực tuyến trên diện rộng, (4) đào tạo giáo viên về kỹ năng số, và (5) ứng dụng dữ liệu lớn (Big Data) vào quản lý giáo dục (Thủ tướng Chính phủ, 2022).

Bên cạnh đó, Chính phủ cũng ban hành Đề án 06 về Phát triển ứng dụng dữ liệu về dân cư, định danh và xác thực điện tử phục vụ chuyển đổi số quốc gia giai đoạn 2022-2025, trong đó ngành giáo dục được xác định là một lĩnh vực trọng tâm. Mục tiêu của Đề án 06 là kết nối hệ thống dữ liệu giáo dục với Cơ sở dữ liệu Quốc gia về Dân cư, nhằm đơn giản hóa thủ tục hành chính, xác thực thông tin cá nhân trong quá trình tuyển sinh và quản lý hồ sơ học sinh (Bộ Công an, 2022).

Nhằm cụ thể hóa chiến lược chuyển đổi số trong từng cấp học, Quyết định số 4740/QĐ-BGDĐT ngày 06/01/2023 của Bộ Giáo dục và Đào tạo đã ban hành Bộ chỉ số đánh giá mức độ chuyển đổi số cho các cơ sở giáo dục đại học, giúp các trường đại học tự đánh giá và điều chỉnh chiến lược chuyển đổi số phù hợp với thực tiễn (Bộ Giáo dục và Đào tạo, 2023). Đồng thời, Quyết định số 3806/QĐ-BGDĐT ngày 29/11/2024 đặt ra Bộ chỉ số đánh giá mức độ chuyển đổi số đối với sở giáo dục và đào tạo, phòng giáo dục và đào tạo, nhằm chuẩn hóa quá trình giám sát và đánh giá mức độ triển khai chuyển đổi số trong hệ thống giáo dục phổ thông (Bộ Giáo dục và Đào tạo, 2024).

Một trong những yếu tố quan trọng trong quá trình chuyển đổi số là đảm bảo an toàn dữ liệu giáo dục, đặc biệt là dữ liệu cá nhân của học sinh, giáo viên. Nhằm thực hiện mục tiêu này, Bộ Giáo dục và Đào tạo đã ban hành Công văn số 4567/BGDĐT-CNTT ngày 22/08/2024, yêu cầu các cơ sở giáo dục thực hiện các biện pháp bảo mật dữ liệu, nâng cao nhận thức về an ninh mạng trong quá trình chuyển đổi số (Bộ Giáo dục và Đào tạo, 2024).

4.3 Kết quả thực hiện chuyển đổi số trong giáo dục Việt Nam

Dựa trên các chính sách đã ban hành, có thể nhận thấy Việt Nam đã đạt được một số kết quả đáng kể trong quá trình chuyển đổi số giáo dục, đặc biệt là trong việc xây dựng cơ sở dữ liệu ngành giáo dục và triển khai hệ sinh thái học tập số. Đến năm 2024, hơn 24 triệu hồ sơ giáo viên và học sinh đã được kết nối với Cơ sở dữ liệu Quốc gia về Dân cư, giúp đơn giản hóa thủ tục hành chính trong quản lý giáo dục (Bộ Giáo dục và Đào tạo, 2024).

Bên cạnh đó, 100% các cơ sở giáo dục đã số hóa dữ liệu về giáo viên, học sinh, trong đó gần 22.000 cơ sở giáo dục mầm non, 26.000 trường phổ thông và gần 1,2 triệu giáo viên đã được đưa vào hệ thống dữ liệu tập trung của Bộ Giáo dục và Đào tạo (Bộ Giáo dục và Đào tạo, 2024). Ngoài ra, Việt Nam đã bước đầu triển khai hệ thống học bạ điện tử và sổ điểm điện tử, giúp học sinh, phụ huynh và giáo viên có thể theo dõi kết quả học tập một cách thuận tiện hơn (Giaoduc.net.vn, 2024).

Mặc dù có nhiều tiến bộ, quá trình chuyển đổi số giáo dục vẫn gặp một số thách thức. Tỷ lệ giáo viên được đào tạo bài bản về công nghệ số chỉ đạt 40%, thấp hơn đáng kể so với các nước trong khu vực như Thái Lan (80%) hay Malaysia (75%) (UNESCO, 2024). Chất lượng hạ tầng công nghệ tại các vùng nông thôn còn hạn chế, với khoảng 40% trường học chưa có kết nối internet tốc độ cao, gây cản trở đến việc triển khai học tập trực tuyến (World Bank, 2023).

Đánh giá kết quả chính sách chuyển đổi số trong giáo dục Việt Nam theo Lý thuyết Chuyển đổi Số trong Giáo dục

Dựa trên Lý thuyết Chuyển đổi Số trong Giáo dục (Redecker & Punie, 2017), quá trình chuyển đổi số được đánh giá dựa trên ba cấp độ chính: Khởi đầu (Emerging), Phát triển (Developing) và Tiên tiến (Advanced). Khi đối chiếu với thực tiễn triển khai các chính sách giáo dục số tại Việt Nam, có thể nhận thấy rằng mức độ chuyển đổi số hiện tại vẫn chủ yếu dừng lại ở giai đoạn Khởi đầu, với một số yếu tố tiến gần đến giai đoạn Phát triển.

Đánh giá về hạ tầng công nghệ trong giáo dục

Hạ tầng công nghệ là yếu tố nền tảng trong quá trình chuyển đổi số giáo dục. Tại Việt Nam, các chính sách như Đề án 131/QĐ-TTg (2022) đã đặt ra mục tiêu hiện đại hóa hạ tầng công nghệ giáo dục, đảm bảo 100% trường học có kết nối internet và sử dụng nền tảng học tập trực tuyến vào năm 2025. Tuy nhiên, theo Báo cáo của Ngân hàng Thế giới (World Bank, 2023), đến năm 2023, chỉ khoảng 60% trường học tại Việt Nam có kết nối internet tốc độ cao, trong khi con số này

tại Thái Lan là 90% và tại Malaysia là 85%. Điều này cho thấy mặc dù có chính sách rõ ràng, việc triển khai trên thực tế vẫn chưa đạt được sự đồng bộ.

4.4 Đánh giá mức độ chuyển đổi số giáo dục của Việt Nam theo Lý thuyết Chuyển đổi Số

Dựa trên ba cấp độ của Lý thuyết Chuyển đổi Số trong Giáo dục (Redecker & Punie, 2017), mức độ chuyển đổi số trong giáo dục Việt Nam có thể được đánh giá theo bảng sau:

Tiêu chí đánh giá	Mức độ	Nhận xét
Hạ tầng công nghệ và kết nối Internet	Phát triển (Developing)	Việt Nam đã đạt 90% trường học có Internet, nhưng còn thiếu đồng bộ ở vùng nông thôn.
Ứng dụng công nghệ vào giảng dạy	Phát triển (Developing)	Hầu hết trường học đã sử dụng LMS và mô hình học trực tuyến kết hợp, nhưng chưa phổ biến toàn quốc.
Đào tạo kỹ năng số cho giáo viên	Phát triển (Developing)	75% giáo viên đã tham gia đào tạo số, nhưng vẫn cần nâng cao chất lượng.
Phát triển nội dung số và tài nguyên học tập mở	Phát triển (Developing)	Đã có hơn 30.000 tài nguyên số hóa, nhưng vẫn thiếu sự đồng bộ
Ứng dụng AI và dữ liệu lớn trong giáo dục	Khởi đầu (Emerging)	Việt Nam mới bắt đầu thử nghiệm AI trong giảng dạy và quản lý.
Hợp tác công - tư và quốc tế	Phát triển (Developing)	Hợp tác với Google, Microsoft, UNESCO giúp mở rộng chuyển đổi số

Nguồn: Tác giả tổng hợp từ các báo cáo UNESCO, World Bank, MHESI Thailand, Bộ GD&ĐT Việt Nam (2024)

Như vậy, dựa trên ba cấp độ chuyển đổi số giáo dục của lý thuyết, Việt Nam vẫn ở cấp độ Khởi đầu

Tiêu chí đánh giá	Việt Nam (Mức độ chuyển đổi số)	So sánh với Thái Lan
Hạ tầng công nghệ trong giáo dục	Khởi đầu (Emerging)	Khởi đầu (Emerging)
Ứng dụng công nghệ trong giảng dạy	Khởi đầu (Emerging)	Phát triển (Developing)
Hệ thống quản lý giáo dục số	Phát triển (Developing)	Phát triển (Developing)
Ứng dụng AI, dữ liệu lớn vào giáo dục	Khởi đầu (Emerging)	Khởi đầu (Emerging)
Chính sách hỗ trợ đào tạo giáo viên về công nghệ	Khởi đầu (Emerging)	Phát triển (Developing)

Việt Nam đang trong giai đoạn chuyển đổi số giáo dục với những bước tiến đáng ghi nhận, tuy nhiên vẫn còn nhiều thách thức cần vượt qua để đạt được mức chuyển đổi số toàn diện. Khi đối chiếu với các quốc gia tiên phong trong khu vực như Singapore, Malaysia, và đồng đẳng như Thái Lan, có thể thấy rằng mặc dù đã xây dựng khung chính sách tương đối đầy đủ, quá trình triển khai thực tế vẫn chưa đồng đều, đặc biệt là ở hạ tầng công nghệ, đào tạo giáo viên, và ứng dụng trí tuệ nhân tạo (AI) trong giảng dạy. Điều này đặt ra câu hỏi Việt Nam có thể học hỏi gì từ các quốc gia Đông Nam Á để tối ưu hóa giáo dục số?

Các quốc gia Đông Nam Á, đặc biệt là Singapore và Malaysia, đã triển khai nhiều chiến lược thành công trong quá trình chuyển đổi số giáo dục mà Việt Nam có thể học hỏi.

Thứ nhất, mô hình phát triển hạ tầng công nghệ và kết nối số toàn diện của Singapore là một bài học quan trọng. Singapore đã đạt được 100% kết nối internet tốc độ cao tại tất cả các cơ sở giáo dục, trong khi tỷ lệ này tại Việt Nam chỉ khoảng 60% (World Bank, 2023). Chính phủ Singapore đã hợp tác chặt chẽ với khu vực tư nhân, đặc biệt là các tập đoàn công nghệ, để đầu tư vào các nền tảng học tập số và AI trong giáo dục (UNESCO, 2024). Việt Nam có thể áp dụng cách tiếp cận này bằng cách khuyến khích đầu tư từ các doanh nghiệp công nghệ trong nước và quốc tế, thúc đẩy mô hình hợp

tác công - tư nhằm đẩy nhanh tiến trình số hóa giáo dục.

Thứ hai, Malaysia đã xây dựng một hệ thống quản lý giáo dục số hiệu quả thông qua các cơ sở dữ liệu giáo dục được kết nối với hệ thống dữ liệu quốc gia. Điều này giúp chính phủ quản lý thông tin học sinh, giáo viên và cơ sở giáo dục một cách chính xác, đồng thời hỗ trợ quá trình đánh giá kết quả học tập và quản lý hồ sơ điện tử. Việt Nam đã bước đầu triển khai hệ thống này nhưng vẫn cần hoàn thiện khả năng khai thác dữ liệu lớn (Big Data) để cá nhân hóa trải nghiệm học tập, giúp học sinh được hỗ trợ theo năng lực cá nhân, thay vì áp dụng mô hình giảng dạy đồng nhất (Bộ Giáo dục và Đào tạo, 2024).

Thứ ba, Malaysia và Thái Lan đã thành công trong việc đào tạo giáo viên về công nghệ số, với tỷ lệ giáo viên được đào tạo về giảng dạy trực tuyến và ứng dụng công nghệ lần lượt là 75% và 80%, trong khi tại Việt Nam con số này chỉ đạt 40% (UNESCO, 2024). Malaysia đã tích hợp công nghệ vào chương trình đào tạo sư phạm, đảm bảo rằng giáo viên không chỉ biết cách sử dụng công nghệ mà còn có thể thiết kế bài giảng số chất lượng cao và ứng dụng AI trong đánh giá học sinh. Đây là hướng đi mà Việt Nam cần đẩy mạnh để giảm bớt sự chênh lệch giữa các vùng miền trong tiếp cận giáo dục số.

Từ những bài học trên, Việt Nam cần những điều chỉnh trọng tâm nào để đạt mức chuyển đổi số toàn diện?

Để tiến lên cấp độ Phát triển (Developing) và hướng tới Tiên tiến (Advanced) theo Lý thuyết Chuyển đổi Số trong Giáo dục, Việt Nam cần thực hiện những điều chỉnh mang tính chiến lược ở ba khía cạnh chính: hạ tầng công nghệ, đào tạo giáo viên, và đổi mới nội dung giảng dạy.

(1) Đẩy nhanh đầu tư vào hạ tầng công nghệ và kết nối số

Cơ sở hạ tầng là nền tảng quan trọng để đảm bảo giáo dục số có thể phát triển một cách toàn diện. Chính phủ cần đầu tư mạnh hơn vào việc mở rộng hạ tầng công nghệ, đặc biệt là ở các vùng nông thôn và miền núi, nơi mà tỷ lệ kết nối internet trong trường học còn thấp. Cụ thể, cần thiết lập chương trình hỗ trợ công nghệ giáo dục quốc gia, trong đó chính phủ cấp kinh phí để nâng cấp mạng lưới internet, trang bị thiết bị số cho giáo viên và học sinh, đồng thời hợp tác với các doanh nghiệp viễn thông để cung cấp dịch vụ internet với giá ưu đãi cho trường học (World Bank, 2023).

(2) Xây dựng hệ thống đào tạo giáo viên về công nghệ số

Chất lượng giáo dục số phụ thuộc rất lớn vào năng lực của giáo viên trong việc ứng dụng công nghệ vào giảng dạy. Việt Nam cần tích hợp các chương trình đào tạo công nghệ số vào hệ thống đào tạo sư phạm, đảm bảo tất cả giáo viên trước khi ra trường đều được đào tạo bài bản về công nghệ giáo dục, giảng dạy trực tuyến, và ứng dụng AI trong đánh giá học sinh (UNESCO, 2024). Ngoài ra, cần có các chương trình đào tạo lại (reskilling) và nâng cao (upskilling) dành cho đội ngũ giáo viên hiện tại, đặc biệt là giáo viên ở các cấp học phổ thông, nhằm giúp họ làm quen với học tập trực tuyến và các phương pháp giảng dạy hiện đại.

(3) Thúc đẩy ứng dụng trí tuệ nhân tạo và dữ liệu lớn trong giáo dục

Việt Nam cần tập trung vào việc ứng dụng AI và dữ liệu lớn để cá nhân hóa học tập, thay vì chỉ sử dụng công nghệ như một công cụ hỗ trợ giảng dạy. Các quốc gia như Singapore đã triển khai AI để phân tích dữ liệu học tập của học sinh, từ đó đưa ra các lộ trình học tập phù hợp với từng cá nhân (OpenGov Asia, 2024). Việt Nam có thể học hỏi mô hình này bằng cách phát triển các nền tảng học tập thông minh sử dụng AI để đánh giá kết quả học tập, nhận diện điểm mạnh/yếu của học sinh, từ đó đề xuất các khóa học phù hợp.

(4) Hoàn thiện hệ thống học liệu điện tử và nền tảng giáo dục mở

Học liệu số đóng vai trò quan trọng trong việc đa dạng hóa phương pháp học tập và giúp học sinh tiếp cận tài liệu chất lượng cao. Việt Nam cần đẩy mạnh phát triển kho học liệu điện tử miễn phí, đảm bảo rằng học sinh ở mọi vùng miền đều có quyền tiếp cận tài liệu số mà không bị rào cản về tài chính hay hạ tầng. Bên cạnh đó, chính phủ cần hỗ trợ các trường học trong việc chuyển đổi nội dung giảng dạy truyền thống sang định dạng số hóa, bao gồm video bài giảng, sách giáo khoa điện tử và các nền tảng học tập tích hợp công nghệ tương tác (World Bank, 2023).

Kết luận chung

Chính sách giáo dục số tại Việt Nam đã có khuôn khổ tương đối đầy đủ và đạt một số thành tựu quan trọng về xây dựng cơ sở dữ liệu giáo dục, triển khai sổ điểm điện tử, học bạ điện tử. Tuy nhiên, so với Singapore hay Malaysia, Việt Nam vẫn chủ yếu ở mức "Khởi đầu - Phát triển" (Emerging - Developing) theo Lý thuyết Chuyển đổi số trong Giáo dục

(Redecker & Punie, 2017). Để tiến tới chuyển đổi số toàn diện, cần có sự đầu tư mạnh mẽ hơn nữa vào hạ tầng kết nối, chương trình đào tạo giáo viên, và đặc biệt là ứng dụng công nghệ tiên tiến như AI, Big Data. Học hỏi kinh nghiệm từ các nước Đông Nam Á, đồng thời nghiên cứu tính đặc thù của bối cảnh trong nước, sẽ giúp Việt Nam từng bước nâng cao chất lượng giáo dục số, sẵn sàng cho những thách thức của kỷ nguyên số.

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PHÁT TRIỂN TÍN DỤNG XANH TẠI NGÂN HÀNG NÔNG NGHIỆP VÀ PHÁT TRIỂN NÔNG THÔN VIỆT NAM

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Tóm tắt: Tín dụng xanh đóng vai trò quan trọng trong việc thúc đẩy phát triển bền vững, giảm phát thải carbon và ứng phó với biến đổi khí hậu. Mặc dù nhiều ngân hàng lớn trên thế giới đã tích cực triển khai, nhưng tại Việt Nam, lĩnh vực này vẫn đối mặt với nhiều thách thức về vốn, chính sách và nhận thức. Agribank đã thực hiện nhiều chính sách nhằm mở rộng tín dụng xanh, hỗ trợ các dự án phát triển bền vững. Nghiên cứu áp dụng phương pháp định tính, bao gồm khảo sát, phỏng vấn bán cấu trúc với nhà quản lý Agribank và phân tích tài liệu thứ cấp để đánh giá thực trạng triển khai tín dụng xanh. Kết quả chỉ ra các nhân tố tác động, những tiến bộ đạt được, hạn chế còn tồn tại, từ đó đề xuất các giải pháp cải thiện chính sách, huy động vốn và nâng cao năng lực triển khai tín dụng xanh.

Từ khóa: Agribank, năng lượng tái tạo, phát triển bền vững, tài chính bền vững, tín dụng xanh.

1. CƠ SỞ LÝ THUYẾT

Tín dụng xanh đang trở thành xu hướng tài chính toàn cầu, đóng vai trò quan trọng trong việc kiểm soát tác động môi trường của doanh nghiệp và thúc đẩy phát triển bền vững (Xu & Li, 2020; Zhang et al., 2022). Trong bối cảnh biến đổi khí hậu và suy thoái tài nguyên, hệ thống ngân hàng ngày càng giữ vị thế chiến lược trong việc điều hướng dòng vốn vào các dự án thân thiện với môi trường, giảm phát thải carbon và hỗ trợ quá trình chuyển đổi sang nền kinh tế xanh. Liên Hợp Quốc đã xác định tài chính bền vững là một trong những công cụ quan trọng để đạt được các Mục tiêu Phát triển Bền vững (SDGs), đặc biệt là SDG 7 (Năng lượng sạch và giá cả hợp lý), SDG 9 (Công nghiệp, đổi mới và cơ sở hạ tầng), và SDG 13 (Hành động vì khí hậu) (UNEP, 2021).

He, Wang và Luo (2022) cũng nhấn mạnh rằng tín dụng xanh không chỉ giúp giảm thiểu tác động tiêu cực đến môi trường mà còn đóng vai trò quan trọng trong việc đạt được các Mục tiêu Phát triển Bền vững (SDGs), đặc biệt là trong lĩnh vực năng lượng tái tạo và công nghiệp bền vững.

Việt Nam là một trong những quốc gia chịu ảnh hưởng nặng nề nhất từ biến đổi khí hậu, với tình trạng nước biển dâng, xâm nhập mặn và thiên tai gia tăng (World Bank, 2022). Nhận thức được tầm quan trọng của tài chính xanh, Chính phủ đã ban hành Chiến lược quốc gia về tăng trưởng xanh (2012, 2021) và Chiến lược phát triển ngành ngân hàng đến năm 2025, tầm nhìn 2030. Nhờ đó, dư nợ tín dụng xanh tại Việt Nam đã tăng trưởng 22%/năm trong giai đoạn 2017-2023, đạt 620.984 tỷ đồng vào cuối năm 2023. Tuy nhiên, tỷ trọng tín dụng xanh vẫn chỉ chiếm 4,5% tổng dư nợ nền kinh tế, thấp hơn đáng kể so với mục tiêu 10% vào năm 2025. Ngoài ra, Việt Nam cũng cần khoảng 368 - 380 tỷ USD (tương đương 6,8% GDP/năm) đến năm 2040 để thực hiện quá trình chuyển đổi xanh, đòi hỏi sự tham gia mạnh mẽ hơn từ khu vực tài chính (ADB, 2023).

Trong hệ thống ngân hàng, Agribank - với vai trò dẫn đầu trong lĩnh vực tam nông - đã chú trọng tín dụng xanh vào nông nghiệp bền vững, năng lượng tái tạo và kinh tế tuần hoàn. Tuy nhiên, việc triển khai gặp nhiều thách thức, bao gồm khung pháp lý chưa hoàn thiện, chi phí đầu tư lớn, thời gian hoàn vốn dài và nhận thức hạn chế từ doanh nghiệp và nhà đầu tư (Agribank, 2024; Kinh tế và Dự báo, 2024; ERAV, 2024).

Trong giai đoạn 2019-2023, Agribank đã đạt được nhiều kết quả tích cực trong tài trợ tín dụng xanh, với dư nợ tín dụng xanh tăng mạnh từ 6.549 tỷ đồng năm 2019 lên 28.277 tỷ đồng năm 2023 (Agribank, 2023). Tuy nhiên, tỷ trọng tín dụng xanh trong tổng dư nợ của Agribank vẫn thấp hơn so với mục tiêu quốc gia. Cụ thể, theo Ngân hàng Nhà nước Việt Nam (SBV), đến cuối năm 2023, dư nợ tín dụng xanh toàn hệ thống ngân hàng đạt 620.984 tỷ đồng, chiếm khoảng 4,5% tổng dư nợ toàn nền kinh tế . Mục tiêu đề ra là tăng trưởng tín dụng xanh đạt 10% vào năm 2025. Ngoài ra, Agribank vẫn gặp nhiều thách thức liên quan đến khung pháp lý chưa hoàn thiện, chi phí đầu tư lớn, rủi ro tín dụng và nhận thức hạn chế từ doanh nghiệp (ADB, 2021; OECD, 2020).

Để giải quyết những vấn đề này, nghiên cứu tập trung vào một câu hỏi chính là làm thế nào để thúc đẩy phát triển tín

dụng xanh tại Agribank? Để làm rõ câu hỏi này, nghiên cứu xem xét ba khía cạnh quan trọng. Thứ nhất, nghiên cứu đánh giá thực trạng triển khai tín dụng xanh tại Agribank, bao gồm tốc độ tăng trưởng, cơ cấu danh mục tài trợ và hiệu quả của các khoản vay xanh. Thứ hai, nghiên cứu phân tích các thách thức mà Agribank đang đối mặt, đặc biệt là những hạn chế về chính sách hỗ trợ, khả năng huy động vốn dài hạn và mức độ sẵn sàng của doanh nghiệp đối với tài chính bền vững (World Bank, 2022). Cuối cùng, nghiên cứu đề xuất các giải pháp để thúc đẩy tín dụng xanh, bao gồm hoàn thiện khung pháp lý, mở rộng hợp tác tài chính xanh với các tổ chức quốc tế và nâng cao nhận thức của doanh nghiệp về lợi ích của tín dụng xanh (IFC, 2022; UNEP, 2021).

1.1. Khái niệm tín dụng xanh

Tín dụng xanh là các khoản tín dụng do ngân hàng cấp cho các dự án sản xuất, kinh doanh không gây rủi ro hoặc nhằm mục đích bảo vệ môi trường. Điều này bao gồm việc tài trợ cho các dự án như năng lượng tái tạo, tiết kiệm năng lượng, quản lý chất thải và các hoạt động thân thiện với môi trường khác (State Bank of Vietnam [SBV], 2023).

Theo Luật Bảo vệ Môi trường năm 2020 của Việt Nam, tín dụng xanh được định nghĩa là "tín dụng được cấp cho dự án đầu tư sử dụng hiệu quả tài nguyên thiên nhiên; ứng phó với biến đổi khí hậu; quản lý chất thải; xử lý ô nhiễm, cải thiện chất lượng môi trường; phục hồi hệ sinh thái tự nhiên; bảo tồn thiên nhiên và đa dạng sinh học; tạo ra lợi ích khác về môi trường"

Tổ chức Hợp tác và Phát triển Kinh tế (OECD) cũng định nghĩa tài chính xanh là nguồn tài chính cung cấp cho các dự án nhằm đạt được tăng trưởng kinh tế, đồng thời giảm ô nhiễm và phát thải khí nhà kính, giảm thiểu chất thải và nâng cao hiệu quả sử dụng tài nguyên thiên nhiên. (Organisation for Economic Co-operation and Development [OECD], 2020)

Tóm lại, tín dụng xanh là công cụ tài chính quan trọng, hỗ trợ các dự án và hoạt động kinh doanh thân thiện với môi trường, góp phần thúc đẩy phát triển bền vững và bảo vệ hệ sinh thái.

1.1.1. Định nghĩa phát triển tín dụng xanh

Tín dụng xanh là một công cụ tài chính giúp hỗ trợ các dự án có tác động tích cực đến môi trường, tập trung vào các lĩnh vực như năng lượng tái tạo, nông nghiệp bền vững, công nghệ sạch và các hoạt động giúp giảm phát thải khí nhà kính (Organisation for Economic Co-operation and Development [OECD], 2020). Tuy nhiên, phát triển tín dụng xanh không chỉ giới hạn ở việc cấp vốn, mà còn bao gồm việc mở rộng danh mục sản phẩm tài chính xanh, nâng cao tiêu chuẩn đánh giá rủi ro môi trường và tăng cường giám sát dòng vốn (World Bank, 2022).

Theo OECD (2020), quá trình phát triển tín dụng xanh đòi hỏi sự phối hợp của nhiều bên liên quan, bao gồm chính phủ, ngân hàng thương mại, tổ chức tài chính quốc tế và khu vực tư nhân, nhằm đảm bảo rằng nguồn vốn xanh được phân bổ một cách hiệu quả và mang lại tác động bền vững. Trong khi tín dụng xanh chủ yếu tập trung vào việc hỗ trợ vốn cho các dự án thân thiện với môi trường, thì phát triển tín dụng xanh yêu cầu hệ thống chính sách hỗ trợ, các quy định chặt chẽ về ESG (Môi trường - Xã hội - Quản trị), cũng như cơ chế giám sát minh bạch nhằm ngăn chặn hiện tượng "greenwashing" – khi các doanh nghiệp nhận vốn nhưng không thực hiện đúng cam kết môi trường (World Bank, 2022).

Một trong những mục tiêu quan trọng của phát triển tín dụng xanh là tăng tỷ trọng tín dụng xanh trong tổng dư nợ ngân hàng, qua đó thúc đẩy quá trình chuyển đổi xanh trong nền kinh tế. Tại Việt Nam, Ngân hàng Nhà nước (State Bank of Vietnam [SBV], 2023) đã đặt mục tiêu đưa tín dụng xanh chiếm 10% tổng dư nợ tín dụng vào năm 2025, nhưng hiện con số này vẫn dừng ở mức 4,5% vào cuối năm 2023. Điều này cho thấy việc phát triển tín dụng xanh không chỉ phụ thuộc vào nguồn vốn của ngân hàng, mà còn đòi hỏi các chính sách ưu đãi, khung pháp lý hoàn thiện và cơ chế giám sát phù hợp nhằm khuyến khích các doanh nghiệp thực hiện các hoạt động kinh doanh bền vững (Asian Development Bank [ADB], 2021).

Như vậy, nếu tín dụng xanh là công cụ giúp cấp vốn cho các dự án bền vững, thì phát triển tín dụng xanh là một chiến lược toàn diện nhằm tích hợp tài chính xanh vào hệ thống ngân hàng và nền kinh tế. Việc mở rộng tín dụng xanh thành công không chỉ giúp giảm thiểu rủi ro khí hậu, mà còn đảm bảo tính dài hạn và ổn định của hệ thống tài chính (ADB, 2021).

1.2. Các lý thuyết nền tảng

Tín dụng xanh không chỉ là một công cụ tài chính giúp kiểm soát tác động môi trường, mà còn là một phần quan trọng trong chiến lược phát triển tài chính bền vững toàn cầu. Việc phát triển tín dụng xanh dựa trên nền tảng của các lý

thuyết tài chính, trong đó nổi bật là Lý thuyết tài chính bền vững (Sustainable Finance Theory) và Lý thuyết ngân hàng xanh (Green Banking Theory). Các lý thuyết này cung cấp khung học thuật giúp phân tích vai trò của ngân hàng trong việc điều hướng dòng vốn vào các dự án có tác động tích cực đến môi trường và xã hội.

1.1.1. Lý thuyết tài chính bền vững (Sustainable Finance Theory)

Lý thuyết tài chính bền vững nhấn mạnh rằng hoạt động tài chính không chỉ tập trung vào tối đa hóa lợi nhuận mà còn phải cân bằng giữa ba yếu tố là kinh tế, xã hội và môi trường (Scholtens, 2006). Theo lý thuyết này, các ngân hàng thương mại cần mở rộng tiêu chí đánh giá rủi ro, không chỉ giới hạn trong rủi ro tài chính mà còn xem xét tác động môi trường và xã hội đến khả năng sinh lời dài hạn (UNEP FI, 2019). Điều này lý giải tại sao tín dụng xanh ngày càng trở thành một phần quan trọng trong chiến lược ngân hàng bền vững, giúp kiểm soát rủi ro khí hậu và đảm bảo tính bền vững của các khoản đầu tư (World Bank, 2022). Trong nghiên cứu này, khung lý thuyết tài chính bền vững được sử dụng để đánh giá những cơ hội và thách thức trong triển khai tín dụng xanh tại Agribank, từ đó đề xuất các giải pháp nhằm nâng cao hiệu quả thực hiện, phù hợp với xu hướng tài chính bền vững và các tiêu chuẩn quốc tế (OECD, 2020).

1.1.2. Lý thuyết ngân hàng xanh (Green Banking Theory)

Lý thuyết ngân hàng xanh xuất hiện vào đầu những năm 2000, khi hệ thống tài chính toàn cầu bắt đầu chú trọng đến tác động môi trường của hoạt động ngân hàng (Jeucken, 2001). Lý thuyết này nhấn mạnh rằng ngân hàng không chỉ đóng vai trò là trung gian tài chính, mà còn có trách nhiệm xã hội trong việc hỗ trợ các mô hình kinh doanh bền vững và hạn chế cấp vốn cho các dự án gây hại đến môi trường (Jeucken & Bouma, 1999). Trong nghiên cứu này, lý thuyết này được áp dụng để phân tích vai trò của Agribank trong triển khai tín dụng xanh theo ba nguyên tắc cốt lõi của ngân hàng xanh

Ba nguyên tắc cốt lõi của ngân hàng xanh bao gồm

(1) Ưu tiên tài trợ các dự án có tác động tích cực đến môi trường, đặc biệt là trong lĩnh vực năng lượng tái tạo, nông nghiệp bền vững và công nghiệp xanh (OECD, 2020) (2) Hạn chế cấp tín dụng cho các dự án có nguy cơ gây ô nhiễm môi trường cao, nhằm giảm rủi ro pháp lý và tổn thất tài chính về dài hạn (Zhang, Wang, & Chen, 2022). (3) Tích hợp tiêu chí môi trường vào đánh giá rủi ro tín dụng, đảm bảo rằng các khoản vay xanh thực sự mang lại giá trị bền vững, thay vì chỉ là một hình thức "greenwashing" (ADB, 2021).

Theo Ngân hàng Phát triển Châu Á (ADB, 2021), các ngân hàng thương mại tại Đông Nam Á đang dần áp dụng mô hình ngân hàng xanh, trong đó tín dụng xanh là một trong những chiến lược trọng tâm. Việc các ngân hàng chuyển hướng sang mô hình ngân hàng xanh không chỉ giúp giảm thiểu rủi ro biến đổi khí hậu mà còn tạo ra cơ hội tiếp cận nguồn vốn ưu đãi từ các tổ chức tài chính quốc tế.

Mặt khác, Lý thuyết ngân hàng xanh nhấn mạnh rằng ngân hàng không chỉ là trung gian tài chính mà còn có vai trò điều hướng dòng vốn vào các dự án thân thiện với môi trường. Trong bối cảnh này, các ngân hàng đã triển khai các khoản vay ưu đãi dành cho nông nghiệp sạch, năng lượng tái tạo, phù hợp với nguyên tắc cốt lõi của ngân hàng xanh (ADB, 2021). Trong trường hợp của Agribank, Lý thuyết Ngân hàng Xanh được áp dụng để phân tích cách ngân hàng ưu tiên tài trợ các dự án xanh và kiểm soát rủi ro môi trường trong hoạt động tín dụng (Jeucken & Bouma, 1999). Tuy nhiên, Agribank vẫn gặp rào cản từ chính sách nội bộ và khung pháp lý chưa hoàn thiện (OECD, 2020; ADB, 2021). Việc áp dụng lý thuyết này giúp nghiên cứu đánh giá thực trạng tín dụng xanh, đồng thời xác định các điều kiện cần thiết để mở rộng quy mô tín dụng xanh một cách bền vững (World Bank, 2022).

2. PHƯƠNG PHÁP NGHIÊN CỨU

2.1. Lý do chọn phương pháp nghiên cứu

Nghiên cứu này sử dụng phương pháp nghiên cứu định tính, vì phương pháp này phù hợp với mục tiêu đánh giá thực trạng triển khai tín dụng xanh, nhận diện các thách thức và đề xuất giải pháp trong hệ thống ngân hàng.

Tín dụng xanh là một lĩnh vực liên quan đến chính sách tài chính, nhận thức của ngân hàng và tác động môi trường, do đó việc thu thập dữ liệu định lượng từ báo cáo tài chính chưa đủ để phản ánh toàn diện các yếu tố tác động đến quá trình triển khai tín dụng xanh. Việc sử dụng phỏng vấn bán cấu trúc giúp khai thác quan điểm, kinh nghiệm thực tiễn và nhận thức của các nhà quản lý ngân hàng về tín dụng xanh, điều mà số liệu thống kê khó có thể đo lường được (Creswell & Poth, 2018).

Hơn nữa, vì tín dụng xanh tại Việt Nam vẫn còn là một lĩnh vực tương đối mới, khung pháp lý và chiến lược triển

khai còn đang trong quá trình hoàn thiện. Do đó, phương pháp nghiên cứu định tính giúp đào sâu vào các vấn đề chưa có nhiều dữ liệu định lượng, đặc biệt là các rào cản trong thực tiễn áp dụng tại Agribank (World Bank, 2022).

Do vậy, phương pháp định tính được lựa chọn vì nó giúp nghiên cứu có thể là hiểu rõ nhận thức, thái độ và mức độ sẵn sàng của ngân hàng đối với tín dụng xanh. Nhận diện các khó khăn và rào cản thực tế từ góc nhìn của các nhà quản lý ngân hàng. Đề xuất các giải pháp cụ thể dựa trên kinh nghiệm thực tiễn thay vì chỉ dựa vào số liệu thống kê.

2.2. Quy trình thu thập dữ liệu

Phỏng vấn bán cấu trúc

Nghiên cứu sử dụng phỏng vấn bán cấu trúc để thu thập dữ liệu từ Giám đốc, Phó Giám đốc và Trưởng phòng ban của các chi nhánh Agribank Những cá nhân này có ảnh hưởng trực tiếp đến việc ra quyết định và giám sát tín dụng xanh, do đó, quan điểm của họ giúp phản ánh chính xác hơn về mức độ thực hiện tín dụng xanh trong hệ thống ngân hàng. Ngoài ra, việc chọn nhóm nhà quản lý thay vì nhân viên tín dụng cấp dưới giúp đảm bảo dữ liệu thu thập có tính chiến lược và phản ánh định hướng dài hạn của ngân hàng. Chọn mẫu có chủ đích (purposive sampling) đảm bảo đối tượng tham gia có kinh nghiệm thực tiễn và hiểu biết sâu về tín dụng xanh (Patton, 2015).

Phân tích tài liệu thứ cấp

Nghiên cứu tổng hợp dữ liệu từ các nguồn là Báo cáo thường niên Agribank (2019-2023) – đánh giá xu hướng tăng trưởng tín dụng xanh; Báo cáo Ngân hàng Nhà nước Việt Nam (SBV, 2023) – chính sách tín dụng xanh và quy định pháp lý; Các nghiên cứu từ tổ chức tài chính quốc tế (World Bank, 2022; OECD, 2020; ADB, 2021) – đối chiếu chính sách tín dụng xanh tại Việt Nam với quốc tế.

2.3. Phương pháp xử lý dữ liệu

Dữ liệu thu thập từ phỏng vấn bán cấu trúc được xử lý thông qua phân tích nội dung (content analysis) nhằm xác định các chủ đề chính liên quan đến thách thức, cơ hội và chiến lược mở rộng tín dụng xanh tại Agribank (Braun & Clarke, 2006).

Quá trình phân tích dữ liệu bao gồm là

(1) Mã hóa dữ liệu là Xác định các chủ đề chung xuất hiện trong các cuộc phỏng vấn (ví dụ là khó khăn trong triển khai, nhu cầu đào tạo nhân sự về tín dụng xanh, thiếu chính sách hỗ trợ từ chính phủ). (2) So sánh với tài liệu thứ cấp là Kiểm chứng các phát hiện từ phỏng vấn bằng cách đối chiếu với báo cáo chính sách, tài liệu học thuật và dữ liệu tài chính từ Agribank. (3)Kết hợp các phát hiện để đề xuất giải pháp từ dữ liệu thu thập, nghiên cứu đưa ra các đề xuất chính sách và giải pháp thực tế để thúc đẩy tín dụng xanh tại Agribank.

3. THỰC TRẠNG PHÁT TRIỂN TÍN DỤNG XANH TẠI AGRIBANK GIAI ĐOẠN 2019-2023

3.1. Phân tích tình hình hoạt động Tín dụng xanh tại Agribank giai đoạn 2019-2023

Bảng 1. Tình hình dư nợ và thu nhập từ hoạt động tín dụng xanh **Đơn vị là Nghìn tỷ, %**

TT	Chỉ tiêu	2019	2020	2021	2022	2023
1	Dư nợ cho vay khách hàng	1.123	1.213	1.314	1.444	1.550
2	Tỷ trọng cho vay trong Nông nghiệp nông thôn	69,7%	69,4%	66,5%	65,8%	62,7%
3	Dư nợ cho vay đối với lĩnh vực xanh	6.549	13.563	13.618	12.000	28.277

Nguồn: Tổng hợp từ Báo cáo thường niên Agribank giai đoạn 2019-2023

Báo cáo thường niên Agribank trong giai đoạn 2019-2023, Agribank đã đạt được những bước tiến đáng kể trong phát triển tín dụng xanh, với tổng dư nợ cho vay trong lĩnh vực này tăng mạnh từ 6.549 tỷ đồng năm 2019 lên 28.277 tỷ đồng năm 2023, chiếm 1,8% tổng dư nợ tín dụng của ngân hàng (Agribank, 2023). Các lĩnh vực được tài trợ chủ yếu bao gồm năng lượng tái tạo (55%), lâm nghiệp bền vững (24,5%) và nông nghiệp xanh (20%). Đặc biệt, số lượng khách hàng tiếp cận tín dụng xanh đạt 42.485, trong đó 96% thuộc lĩnh vực lâm nghiệp bền vững, cho thấy sự tập trung vào các dự án giảm thiểu tác động môi trường và phát triển bền vững.

Mặc dù tỷ trọng cho vay trong lĩnh vực nông nghiệp và nông thôn giảm từ 69,7% năm 2019 xuống còn 62,7% năm 2023, tín dụng xanh đã trở thành một trong những công cụ quan trọng trong việc tái cơ cấu danh mục cho vay của Agribank. Điều này phản ánh xu hướng chung trong ngành ngân hàng khi dần chuyển hướng sang các khoản tín dụng

thân thiện với môi trường, phù hợp với chiến lược tài chính bền vững quốc gia. Bên cạnh đó, nhằm quản lý rủi ro môi trường trong hoạt động cấp tín dụng, Agribank đã ban hành Quy định 1289/QĐ/NHNo-RRTD (31/5/2023), tuân thủ yêu cầu theo Thông tư 17/2022/TT-NHNN của Ngân hàng Nhà nước về việc tích hợp các tiêu chuẩn môi trường, xã hội và quản trị (ESG) vào hoạt động tín dụng.

Ngoài hoạt động tín dụng, Agribank còn tham gia thị trường tín chỉ carbon với tổng giá trị giao dịch đạt 51,5 triệu USD, một bước tiến quan trọng trong việc mở rộng thị trường tài chính xanh và nâng cao giá trị kinh tế từ các dự án giảm phát thải. Đồng thời, ngân hàng đẩy mạnh chương trình giáo dục ESG, hợp tác quốc tế và ứng dụng công nghệ tài chính (Fintech) để tối ưu hóa quy trình thẩm định và tài trợ dự án xanh. Những nỗ lực này không chỉ giúp Agribank nâng cao vị thế trong lĩnh vực tài chính bền vững mà còn góp phần thực hiện chiến lược tăng trưởng xanh của quốc gia và mục tiêu phát triển bền vững (SDGs) của Liên Hợp Quốc.

3.2. Dư nợ Tín dụng xanh của Agribank so với các ngân hàng thương mại tại Việt Nam

Bảng 2. Tình hình dư nợ tín dụng xanh của nhóm Big4 tính đến 31/12/ 2023

Đơn vị là Nghìn tỷ, %

Chỉ tiêu	BIDV	Vietinbank	Vietcombank	Agribank
Tổng dư nợ TDX nhóm Big4	74.177	47.465	46.100	28.277
Dư nợ TDX của Agribank so nhóm Big4	38,12%	59,57%	61,34%	

Nguồn: Từ báo cáo thường niên các ngân hàng mà tác giả thu thập được.

Mặc dù có những bước tiến đáng kể trong việc triển khai tín dụng xanh, quy mô dư nợ của Agribank vẫn thấp hơn so với các ngân hàng thương mại khác trong nhóm Big4. Tính đến ngày 31/12/2023, BIDV dẫn đầu với tổng dư nợ tín dụng xanh đạt 74.177 tỷ đồng, tiếp theo là VietinBank (47.465 tỷ đồng) và Vietcombank (46.100 tỷ đồng), trong khi Agribank ghi nhận mức 28.277 tỷ đồng (Báo cáo thường niên Agribank, 2023). Xét về tỷ trọng, dư nợ tín dụng xanh của Agribank chỉ đạt 38,12% so với BIDV, 59,57% so với VietinBank và 61,34% so với Vietcombank.

Sự chênh lệch này có thể xuất phát từ đặc thù hoạt động của Agribank, khi ngân hàng này tập trung vào lĩnh vực nông nghiệp, nông thôn, nơi khả năng tiếp cận tín dụng xanh còn gặp nhiều hạn chế. Ngược lại, các ngân hàng thương mại như BIDV, VietinBank và Vietcombank có ưu thế trong việc tài trợ các dự án lớn thuộc năng lượng tái tạo, sản xuất công nghiệp xanh và tài chính bền vững – những lĩnh vực có quy mô tín dụng xanh cao hơn. (Bộ Nông nghiệp và Phát triển Nông thôn, MARD, 2023)

Tuy nhiên, không thể phủ nhận vai trò quan trọng của Agribank trong việc thúc đẩy tín dụng xanh tại Việt Nam, đặc biệt trong khu vực nông nghiệp. Agribank hiện đang phối hợp với Bộ Nông nghiệp và Phát triển Nông thôn để triển khai chương trình 1 triệu ha vùng chuyên canh lúa chất lượng cao, phát thải thấp trước năm 2030, góp phần giảm thiểu tác động của biến đổi khí hậu và đảm bảo an ninh lương thực bền vững. (Bộ Nông nghiệp và Phát triển Nông thôn, MARD, 2023)

3.3. Định hướng của Ban lãnh đạo Agribank về Tín dụng xanh

Ban lãnh đạo Agribank xác định tín dụng xanh là một trong những mục tiêu chiến lược trong giai đoạn 2023-2025, với tầm nhìn phát triển tín dụng bền vững đến năm 2030. Tại Hội thảo "Tín dụng xanh - Việt Nam không thể chậm chân với Net Zero" tổ chức vào tháng 9/2023, Phó Tổng Giám đốc Hoàng Minh Ngọc nhấn mạnh cam kết của Agribank trong việc tích hợp các yếu tố ESG (Môi trường - Xã hội - Quản trị) vào chiến lược phát triển, đồng thời tối ưu hóa nguồn vốn để hỗ trợ các dự án thân thiện với môi trường (Agribank, 2023).

Để hiện thực hóa cam kết này, Agribank đã thành lập Ban chỉ đạo ESG, xây dựng khung tài chính xanh và tích hợp các tiêu chí môi trường vào chính sách quản lý rủi ro tín dụng. Việc đảm bảo rằng các khoản vay không gây tác động tiêu cực đến môi trường đã trở thành một nguyên tắc quan trọng trong hoạt động tín dụng của ngân hàng. Đồng thời, Agribank đã triển khai chương trình tín dụng xanh quy mô 50.000 tỷ đồng, tập trung vào sản xuất nông nghiệp sạch và năng lượng tái tạo, với lãi suất ưu đãi giảm từ 0,5-1,5%/năm so với mức thông thường (Ngân hàng Nhà nước Việt Nam [SBV], 2022).

Song song với chiến lược tín dụng, Agribank cũng đẩy mạnh ứng dụng công nghệ, triển khai điểm giao dịch lưu động nhằm mở rộng khả năng tiếp cận tín dụng xanh đến vùng sâu, vùng xa. Đặc biệt, ngân hàng đã hợp tác với các tổ chức tài chính quốc tế như Ngân hàng Thế giới (WB), Ngân hàng Phát triển châu Á (ADB), Quỹ Khí hậu Xanh (GCF) để tham

gia các dự án về nông nghiệp bền vững, cấp nước sạch và giảm phát thải carbon (World Bank, 2022).

Với định hướng chiến lược và cam kết mạnh mẽ, Agribank không chỉ khẳng định vai trò tiên phong trong tín dụng xanh, mà còn góp phần quan trọng trong xây dựng nền kinh tế tuần hoàn và hiện thực hóa mục tiêu trung hòa carbon vào năm 2050 của Việt Nam. Từ năm 2016, ngân hàng đã phối hợp với Bộ Nông nghiệp và Phát triển Nông thôn (MARD) và Đài Truyền hình Việt Nam (VTV) triển khai chương trình "Nông nghiệp sạch", thúc đẩy mô hình Chương trình Mỗi xã một sản phẩm (OCOP) và hỗ trợ doanh nghiệp tiếp cận nguồn vốn ưu đãi cho nông nghiệp công nghệ cao.

Bên cạnh đó, Agribank cũng tham gia nhiều dự án tài trợ bởi WB, ADB và GCF, trong đó có các chương trình phát triển năng lượng tái tạo, cấp nước sạch và hỗ trợ nông nghiệp carbon thấp. Đặc biệt, Agribank là ngân hàng được chỉ định phục vụ dự án FMCR (Forest Management and Climate Resilience), giúp nâng cao khả năng chống chịu thiên tai và phát triển lâm nghiệp bền vững (ADB, 2023).

Trong lĩnh vực xuất khẩu, Agribank đã triển khai gói tín dụng 15.000 tỷ đồng nhằm hỗ trợ các doanh nghiệp hoạt động trong lĩnh vực thủy sản và lâm sản, đồng thời mở rộng sang dệt may xanh và công nghiệp sạch, phù hợp với xu hướng chuyển đổi xanh trong thương mại toàn cầu và yêu cầu về ESG từ các thị trường xuất khẩu (Green Climate Fund. (2022).

4. KẾT QUẢ NGHIÊN CỨU

4.1. Đánh giá triển khai hoạt động Tín dụng xanh tại Agribank thông qua khảo sát ý kiến chuyên gia.

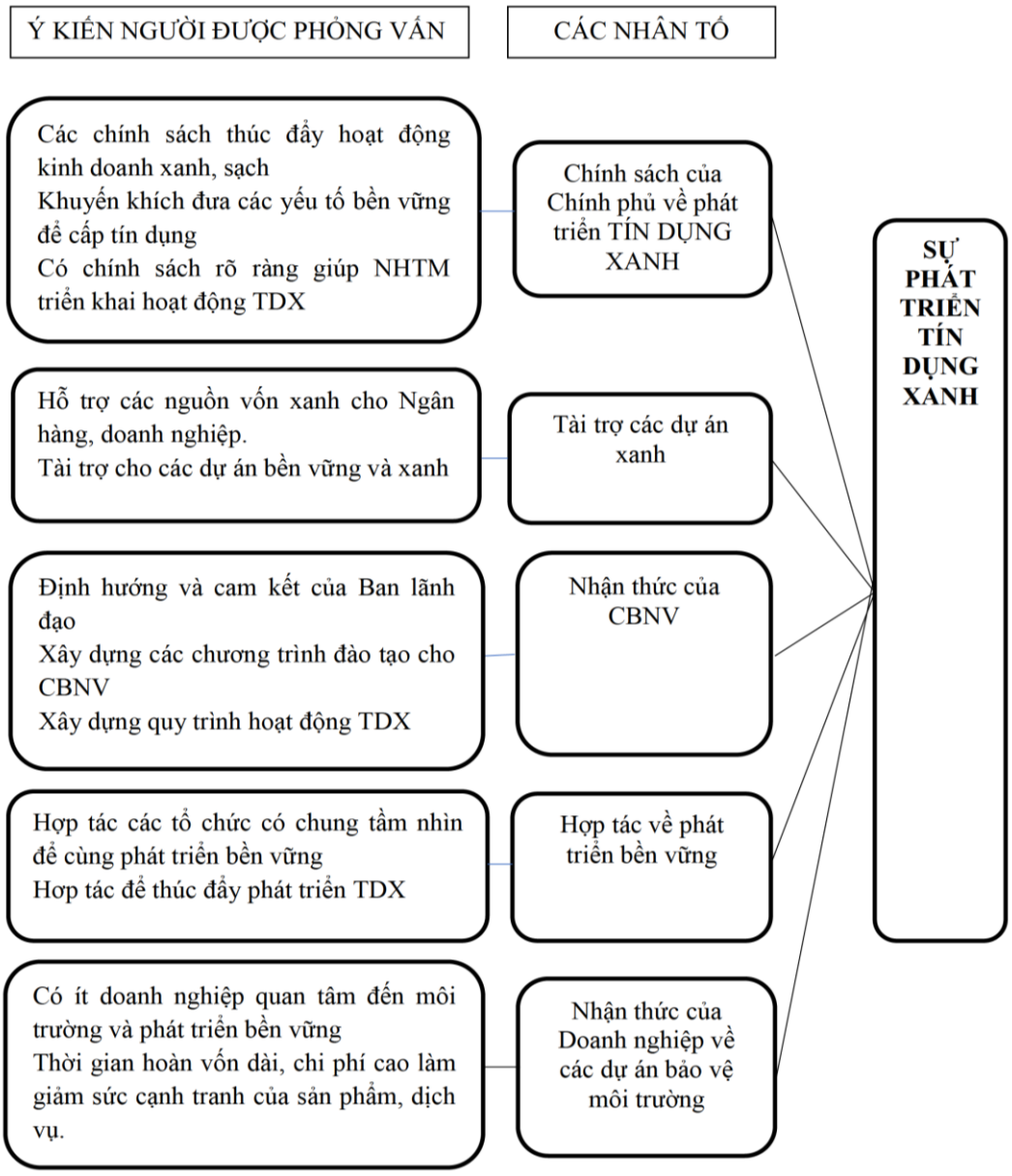
Nghiên cứu này được thực hiện thông qua phỏng vấn bán cấu trúc với 30 chuyên gia ngân hàng tại 5 chi nhánh Agribank trên toàn quốc, bao gồm lãnh đạo đương nhiệm và cựu lãnh đạo đã nghỉ hưu từ 5-10 năm. Các chi nhánh được lựa chọn đều có kinh nghiệm tối thiểu 5 năm trong triển khai tín dụng xanh, đồng thời đóng vai trò quan trọng trong tài trợ các dự án năng lượng tái tạo, nông nghiệp sạch, lâm nghiệp bền vững và bảo vệ môi trường.

Dữ liệu được thu thập trong giai đoạn 2019-2023, thông qua các cuộc phỏng vấn trực tiếp và qua điện thoại. Thời lượng trung bình của mỗi cuộc phỏng vấn là 40 phút (dao động từ 30-65 phút). Một số cuộc phỏng vấn được ghi âm khi có sự đồng ý của người tham gia nhằm đảm bảo tính chính xác và khách quan. Nội dung phỏng vấn tập trung vào các chủ đề chính là Nhận thức về tín dụng xanh và tiêu chí ESG (Môi trường - Xã hội - Quản trị); Những thách thức trong quá trình triển khai tín dụng xanh tại Agribank; Đánh giá hiệu quả của các chính sách tín dụng xanh hiện tại; Các giải pháp nhằm thúc đẩy tín dụng xanh trong hệ thống ngân hàng.

Dữ liệu phỏng vấn được phân tích bằng phương pháp mã hóa chủ đề (thematic coding) dựa trên hướng dẫn của Braun & Clarke (2006). Kết quả phân tích cho thấy rằng tín dụng xanh tại Agribank đang phát triển nhưng còn nhiều hạn chế, đặc biệt liên quan đến là Thiếu khung pháp lý cụ thể. Các quy định về tiêu chuẩn tín dụng xanh, tiêu chí đánh giá dự án xanh chưa rõ ràng (World Bank, 2022); Cơ chế ưu đãi chưa đủ hấp dẫn như lãi suất và thời gian ân hạn chưa đủ cạnh tranh so với các khoản vay truyền thống (ADB, 2021).; Nguồn vốn dài hạn chưa ổn địnhlà Các ngân hàng gặp khó khăn trong việc tiếp cận nguồn vốn xanh với chi phí thấp (OECD, 2020); Thiếu sự phối hợp giữa các phòng ban Việc triển khai tín dụng xanh chưa đồng bộ trong toàn hệ thống Agribank, dẫn đến chậm trễ trong quá trình phê duyệt và cấp vốn; Hạn chế về đào tạo nhân sự Nhân viên tín dụng chưa được đào tạo bài bản về các tiêu chí đánh giá dự án xanh.

4.2. Các nhân tố ảnh hưởng đến phát triển Tín dụng xanh tại Agribank

Từ kết quả nghiên cứu, kết hợp với các nghiên cứu trước đây, nghiên cứu này đã xác định các yếu tố tác động đến sự phát triển tín dụng xanh tại Agribank, được tổng kết trong



Hình 1: Tổng kết các yếu tố tác động đến phát triển TDX

Sự phát triển tín dụng xanh tại Agribank chịu tác động từ nhiều yếu tố nội tại và ngoại tại, trong đó nguồn vốn, cam kết lãnh đạo, năng lực nhân sự và chính sách hỗ trợ đóng vai trò quan trọng. Việc nhận diện các yếu tố này dựa trên Lý thuyết Ngân hàng Xanh (Green Banking Theory) của Jeucken & Bouma (1999) và Lý thuyết Tài chính Bền vững (Sustainable Finance Theory) của Scholtens (2006), giúp phân tích cách Agribank có thể tối ưu hóa triển khai tín dụng xanh. Các yếu tố này quyết định mức độ mở rộng tín dụng xanh cũng như khả năng tiếp cận nguồn vốn dài hạn để tài trợ cho các dự án thân thiện với môi trường.

Yếu tố nội tại

Một trong những yếu tố quan trọng tác động đến tín dụng xanh là nguồn vốn, quyết định quy mô và khả năng triển khai các chương trình tín dụng xanh. Theo Lý thuyết Tài chính Bền vững, các tổ chức tài chính cần đảm bảo nguồn vốn dài hạn với chi phí thấp để tài trợ cho các dự án xanh (Scholtens, 2006). Tuy nhiên, Agribank vẫn gặp khó khăn trong huy động vốn xanh, dẫn đến hạn chế trong việc cấp tín dụng ưu đãi (World Bank, 2022). Ngân hàng Nhà nước Việt Nam (SBV, 2023) cũng ghi nhận rằng tín dụng xanh chỉ chiếm khoảng 4,5% tổng dư nợ toàn hệ thống ngân hàng, thấp hơn mục tiêu 10% vào năm 2025, cho thấy nguồn vốn chưa thực sự ổn định (SBV, 2023).

Theo Lý thuyết Ngân hàng Xanh, sự cam kết của ban lãnh đạo là yếu tố then chốt trong việc mở rộng tín dụng xanh (Jeucken & Bouma, 1999). Các ngân hàng có chiến lược ESG rõ ràng sẽ ưu tiên tài trợ cho các dự án có lợi ích môi

trường. Weber (2016) cũng nhấn mạnh rằng sự cam kết từ lãnh đạo ngân hàng là động lực chính để triển khai tài chính bền vững. Theo Báo cáo thường niên của Agribank (2023), ngân hàng đã cam kết tăng cường tín dụng xanh nhưng vẫn thiếu chính sách cụ thể về ưu đãi lãi suất và thời gian ân hạn, khiến các doanh nghiệp chưa mặn mà tiếp cận (Agribank, 2023).

Bên cạnh đó, năng lực nhân sự đóng vai trò quan trọng trong triển khai tín dụng xanh. Theo Scholtens (2006), ngân hàng cần nâng cao khả năng đánh giá rủi ro môi trường và quản trị tín dụng xanh. Tuy nhiên, nhân viên Agribank vẫn thiếu kiến thức chuyên sâu về ESG, làm giảm hiệu quả thẩm định các dự án xanh (OECD, 2020). ADB (2022) cũng nhận định rằng thiếu chuyên môn về ESG là một trong những rào cản lớn đối với sự phát triển tín dụng xanh tại Đông Nam Á, trong đó Việt Nam không phải ngoại lệ (ADB, 2022).

Cuối cùng, sự phối hợp nội bộ giữa các phòng ban ảnh hưởng đáng kể đến việc triển khai tín dụng xanh. Theo Jeucken & Bouma (1999), ngân hàng xanh cần có sự hợp tác chặt chẽ giữa các bộ phận thẩm định, quản lý rủi ro và tài chính. Báo cáo của Tổ chức Hợp tác và Phát triển Kinh tế (OECD, 2020) cũng nhấn mạnh rằng sự thiếu phối hợp nội bộ làm giảm hiệu quả quản lý rủi ro môi trường, điều này tương tự với những gì đang diễn ra tại Agribank (OECD, 2020).

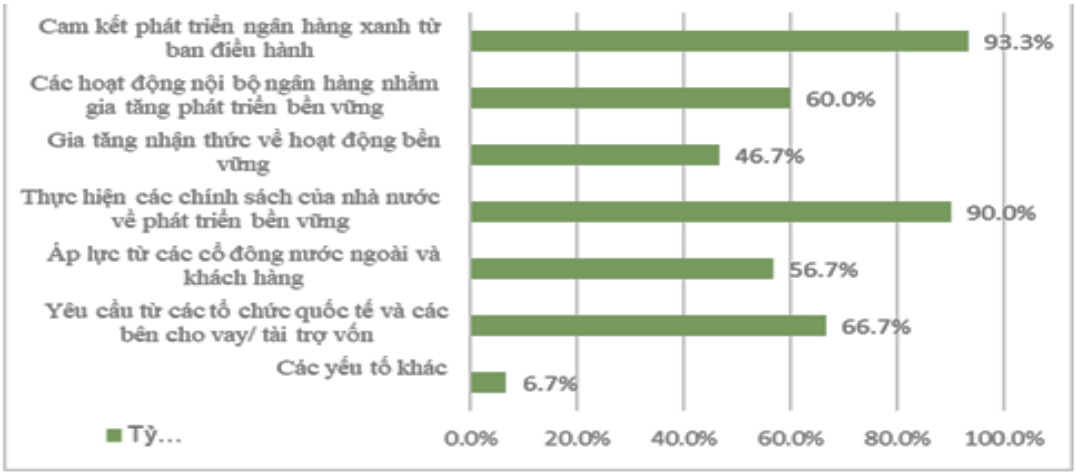
Yếu tố bên ngoài

Bên cạnh các yếu tố nội tại, sự phát triển tín dụng xanh tại Agribank chịu tác động từ nhiều yếu tố bên ngoài, bao gồm nhận thức doanh nghiệp, chính sách của chính phủ, áp lực từ các tổ chức tài chính toàn cầu và hợp tác quốc tế.

Theo Lý thuyết Tài chính Bền vững, các doanh nghiệp phải có trách nhiệm xã hội khi huy động vốn và sử dụng tài chính theo hướng thân thiện với môi trường (Scholtens, 2006). Tuy nhiên, nhiều doanh nghiệp vẫn ưu tiên lợi ích kinh tế ngắn hạn hơn là đáp ứng các tiêu chuẩn ESG, khiến việc tiếp cận tín dụng xanh còn hạn chế (Ngân hàng Nhà nước Việt Nam [SBV], 2023). Theo Báo cáo Phát triển Bền vững 2023 của World Bank, chỉ 30% doanh nghiệp vừa và nhỏ tại Việt Nam có kế hoạch tích hợp yếu tố xanh vào hoạt động kinh doanh do lo ngại về chi phí đầu tư ban đầu (World Bank, 2023).

Theo Lý thuyết Ngân hàng Xanh, chính sách của chính phủ và ngân hàng trung ương đóng vai trò quan trọng trong việc định hướng phát triển tài chính bền vững (Jeucken & Bouma, 1999). Tuy nhiên, hiện tại, khung pháp lý cho tín dụng xanh tại Việt Nam chưa hoàn thiện. Theo báo cáo của Ngân hàng Nhà nước Việt Nam, tín dụng xanh chiếm khoảng 4,5% tổng dư nợ, thấp hơn nhiều so với mục tiêu 10% vào năm 2025, do thiếu ưu đãi về lãi suất và cơ chế hỗ trợ từ chính phủ (SBV, 2023). Ngược lại, Trung Quốc đã thành công hơn trong việc triển khai tín dụng xanh nhờ chính sách hỗ trợ mạnh mẽ từ chính phủ, bao gồm miễn giảm thuế và ưu đãi vay vốn (Wang et al., 2019).

Tín dụng xanh tại Agribank cũng chịu ảnh hưởng từ các tiêu chuẩn tài chính quốc tế. Theo Lý thuyết Tài chính Bền vững, ngân hàng phải tuân thủ các tiêu chí ESG để tiếp cận nguồn vốn quốc tế và giảm rủi ro pháp lý (Scholtens, 2006). Báo cáo của ADB (2022) nhấn mạnh rằng việc tham gia các sáng kiến tài chính bền vững như Nguyên tắc Ngân hàng Có Trách nhiệm (PRB) giúp ngân hàng mở rộng khả năng huy động vốn xanh (ADB, 2022).



Hình 2: Mức độ tác động của các nhân tố đến phát triển Tín dụng xanh

(Nguồn: Tổng hợp từ kết quả nghiên cứu)

Hợp tác với các tổ chức tài chính quốc tế là một công cụ quan trọng để phát triển tín dụng xanh (Jeucken & Bouma, 1999). Tuy nhiên, theo báo cáo của OECD (2020), nhiều ngân hàng thương mại Việt Nam chưa đáp ứng đủ tiêu chuẩn minh bạch và đánh giá ESG, gây khó khăn trong việc tiếp cận nguồn vốn từ IFC, World Bank, Green Climate Fund (OECD, 2020). Do đó, Agribank cần cải thiện năng lực quản lý rủi ro ESG và hoàn thiện hệ thống báo cáo tài chính xanh để tận dụng các nguồn vốn quốc tế.

Hình 2 phản ánh kết quả phỏng vấn về các nhân tố ảnh hưởng đến phát triển tín dụng xanh. Trong đó, Cam kết từ ban điều hành (93.3%) và Chính sách của nhà nước (90.0%) là hai nhân tố quan trọng nhất, cho thấy sự cần thiết của chỉ đạo từ cấp quản lý cao nhất và khung pháp lý rõ ràng trong thúc đẩy tín dụng xanh.

Yêu cầu từ tổ chức quốc tế và bên cho vay/tài trợ vốn (66.7%) cùng áp lực từ cổ đông nước ngoài và khách hàng (56.7%) đều có ảnh hưởng đáng kể, phản ánh mối quan tâm quốc tế và sự đòi hỏi từ các bên liên quan.

Các hoạt động nội bộ ngân hàng (60.0%) và nhận thức về phát triển bền vững (46.7%) cần được cải thiện để nâng cao hiệu quả triển khai tín dụng xanh. Các yếu tố khác chiếm tỷ lệ thấp (6.7%), cho thấy chúng chưa phải là trọng tâm chính trong nghiên cứu này.

5. ĐÁNH GIÁ TÌNH HÌNH PHÁT TRIỂN TÍN DỤNG XANH TẠI AGRIBANK

5.1 Thành tựu đạt được

Agribank đã đạt được những bước tiến quan trọng trong việc triển khai tín dụng xanh, khẳng định vai trò tiên phong trong tài chính bền vững tại Việt Nam. Theo Ngân hàng Nhà nước Việt Nam (SBV, 2023), tổng dư nợ tín dụng xanh tại Agribank đạt 28.277 tỷ đồng vào năm 2023, tài trợ cho 42.883 khách hàng trên toàn quốc. Các khoản vay chủ yếu tập trung vào năng lượng tái tạo (55%), lâm nghiệp bền vững (24,5%) và nông nghiệp sạch (20%), đóng góp tích cực vào mục tiêu giảm phát thải khí nhà kính và thúc đẩy tăng trưởng xanh (World Bank, 2022).

Bên cạnh việc mở rộng danh mục tín dụng xanh, Agribank đã đẩy mạnh ứng dụng công nghệ số trong thẩm định khoản vay, cải thiện khả năng đánh giá rủi ro môi trường thông qua các tiêu chí ESG (Môi trường - Xã hội - Quản trị). Ngân hàng cũng phối hợp với Bộ Nông nghiệp và Phát triển Nông thôn (MARD) để tài trợ các mô hình nông nghiệp carbon thấp, triển khai chương trình 1 triệu ha lúa phát thải thấp nhằm hiện thực hóa cam kết tại COP26 và thực hiện các Mục tiêu Phát triển Bền vững (SDGs) của Liên Hợp Quốc (ADB, 2022).

5.2 Hạn chế trong triển khai tín dụng xanh

Mặc dù đạt được những kết quả tích cực, quá trình triển khai tín dụng xanh tại Agribank vẫn đối mặt với một số thách thức đáng kể khi so sánh với các nguyên tắc của Lý thuyết tài chính bền vững và Lý thuyết ngân hàng xanh. Trước hết, khung pháp lý về tín dụng xanh còn chưa đồng bộ, chưa có hướng dẫn chi tiết về tiêu chí đánh giá dự án xanh và cơ chế giám sát sau cấp vốn (OECD, 2020). So với các nước phát triển như Đức hay Singapore, Việt Nam chưa có quy định cụ thể về các mức ưu đãi lãi suất cho doanh nghiệp vay tín dụng xanh hoặc quy trình đánh giá tác động môi trường minh bạch (World Bank, 2022).

Ngoài ra, cơ chế huy động vốn xanh còn hạn chế, khiến Agribank gặp khó khăn trong việc cung cấp các khoản vay với lãi suất ưu đãi. Hiện nay, ngân hàng vẫn chủ yếu dựa vào nguồn vốn huy động ngắn hạn, trong khi các dự án xanh có thời gian hoàn vốn dài, đòi hỏi nguồn tài chính ổn định hơn (ADB, 2021).

Nhân sự ngân hàng chưa được đào tạo bài bản về quản lý rủi ro môi trường. Theo khảo sát, chỉ 45% nhân viên tín dụng tại Agribank đã được tiếp cận với chương trình đào tạo về tài chính bền vững, khiến việc thẩm định và giám sát các dự án xanh còn nhiều hạn chế (SBV, 2023).

Bên cạnh đó, nhận thức của doanh nghiệp về tín dụng xanh chưa cao. Nhiều doanh nghiệp vẫn tập trung vào lợi ích kinh tế ngắn hạn, e ngại các yêu cầu ESG nghiêm ngặt hoặc chưa thấy được lợi ích từ việc tiếp cận vốn xanh. Điều này dẫn đến nhu cầu vay tín dụng xanh vẫn ở mức thấp so với các loại tín dụng thông thường (Patton, 2015).

Cuối cùng, thị trường vốn xanh tại Việt Nam còn kém phát triển, các công cụ tài chính như trái phiếu xanh, chứng chỉ carbon chưa được phổ biến rộng rãi, hạn chế khả năng huy động vốn dài hạn cho tín dụng xanh (OECD, 2020).

5.3 Định hướng phát triển và đề xuất giải pháp

Để khắc phục những hạn chế trên và mở rộng tín dụng xanh, Agribank cần thực hiện một chiến lược tổng thể nhằm

nâng cao hiệu quả triển khai tài chính bền vững. Các giải pháp cụ thể bao gồm

(1) Hoàn thiện khung pháp lý và chính sách hỗ trợ

Cần sớm xây dựng tiêu chí cụ thể về đánh giá dự án xanh, đảm bảo tính minh bạch trong việc phân loại các khoản vay xanh. Ngân hàng Nhà nước Việt Nam (SBV) cần có hướng dẫn chi tiết về cơ chế ưu đãi lãi suất, chính sách miễn giảm thuế cho doanh nghiệp vay tín dụng xanh và tiêu chí giám sát sau khi cấp vốn để tránh hiện tượng "greenwashing" – tức doanh nghiệp vay vốn xanh nhưng không thực hiện đúng cam kết môi trường (World Bank, 2022).

Ngoài ra, Agribank có thể kiến nghị chính phủ tạo quỹ bảo lãnh tín dụng xanh nhằm giảm thiểu rủi ro khi cấp vốn cho các dự án có chu kỳ hoàn vốn dài. Việc học hỏi mô hình Quỹ Đầu tư Xanh của EU có thể giúp ngân hàng phát triển chiến lược tài trợ dài hạn hiệu quả hơn (OECD, 2020).

(2) Mở rộng huy động vốn và đa dạng hóa sản phẩm tài chính xanh

Theo báo cáo của IFC (2022), các ngân hàng tại các thị trường mới nổi cần có sự hỗ trợ từ ngân hàng trung ương và chính phủ thông qua khung pháp lý rõ ràng, cơ chế ưu đãi tài chính và chính sách bảo lãnh rủi ro tín dụng xanh.

Việc Agribank mở rộng hợp tác với các tổ chức tài chính quốc tế như IFC, ADB, GCF có thể giúp ngân hàng tiếp cận nguồn vốn dài hạn cho các dự án bền vững.

Agribank có thể hợp tác với các tổ chức tài chính quốc tế để tiếp cận nguồn vốn ưu đãi từ World Bank, ADB, Green Climate Fund (GCF) nhằm tăng cường nguồn vốn dài hạn cho tín dụng xanh. Một chiến lược quan trọng khác là phát hành trái phiếu xanh – mô hình đã thành công tại nhiều quốc gia nhằm huy động vốn đầu tư vào các dự án bền vững (ADB, 2021).

Bên cạnh đó, ngân hàng có thể phát triển các sản phẩm tài chính xanh linh hoạt hơn, như chương trình vay ưu đãi cho doanh nghiệp đạt tiêu chuẩn ESG, tài trợ dự án năng lượng tái tạo theo cơ chế PPA (Power Purchase Agreement), giúp doanh nghiệp dễ dàng tiếp cận tín dụng xanh hơn (SBV, 2023).

(3) Nâng cao năng lực nhân sự và quản trị rủi ro môi trường

Việc tổ chức các chương trình đào tạo chuyên sâu về tài chính xanh, quản lý rủi ro môi trường, tiêu chuẩn ESG là cần thiết để đảm bảo nhân sự ngân hàng có đủ năng lực thẩm định các khoản vay xanh. Các chương trình này có thể kết hợp với các tổ chức như IFC, ADB nhằm cập nhật xu hướng tài chính bền vững quốc tế (OECD, 2020).

Ngoài ra, cần tích hợp công nghệ số vào quản lý rủi ro môi trường. Sử dụng AI và dữ liệu lớn (Big Data) để phân tích tác động môi trường của các dự án có thể giúp tối ưu hóa quá trình thẩm định và giám sát khoản vay xanh (SBV, 2023).

(4) Nâng cao nhận thức khách hàng và thúc đẩy truyền thông về tín dụng xanh

Một trong những thách thức lớn là thiếu nhận thức của doanh nghiệp về lợi ích tín dụng xanh. Agribank cần triển khai các hội thảo, chương trình tư vấn về tài chính xanh, giúp doanh nghiệp hiểu rõ các tiêu chuẩn ESG và lợi ích khi tham gia vào hệ sinh thái tín dụng xanh (World Bank, 2022).

Ngoài ra, ngân hàng có thể hợp tác với Bộ Công Thương, Bộ Khoa học & Công nghệ để triển khai các chiến dịch truyền thông về tài chính bền vững, giúp mở rộng thị trường vốn xanh tại Việt Nam.

KẾT LUẬN

Tín dụng xanh đóng vai trò quan trọng trong thúc đẩy tài chính bền vững và giảm tác động môi trường. Agribank đã đạt được nhiều kết quả tích cực nhưng vẫn đối mặt với các thách thức như khung pháp lý chưa hoàn thiện, hạn chế về nguồn vốn và nhận thức của doanh nghiệp. Để mở rộng tín dụng xanh, cần hoàn thiện chính sách, đa dạng hóa nguồn vốn, nâng cao năng lực nhân sự và đẩy mạnh truyền thông. Với chiến lược phù hợp, Agribank có thể giữ vững vai trò tiên phong, góp phần vào phát triển kinh tế xanh tại Việt Nam.

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DẠY HỌC XÁC SUẤT – THỐNG KÊ VỚI VBA EXCEL

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TÓM TẮT

Phần mềm Microsoft Excel có sẵn bộ công cụ tính toán xác suất và xử lí số liệu thống kê có thể được sử dụng để minh họa trực quan trong dạy học. Tuy nhiên, do không phải là phần mềm thống kê chuyên dụng nên Excel chưa tích hợp đầy đủ các công cụ cần thiết cho nhu cầu dạy học xác suất – thống kê. Để bổ sung, người sử dụng có thể dùng ngôn ngữ lập trình Visual Basic for Applications (VBA) tạo mới các công cụ theo nhu cầu sử dụng. Bài báo này giới thiệu một số công cụ được lập trình bằng VBA trên Excel và trình bày sơ lược về cách dùng chúng để minh họa trong quá trình dạy học xác suất – thống kê.

Từ khóa: dạy học xác suất - thống kê, Microsoft Excel, phần mềm dạy và học xác suất - thống kê, Visual Basic for Applications (VBA).

1. MỞ ĐẦU

Hiện nay, với sự phát triển của công nghệ máy tính, việc dạy và học xác suất - thống kê bằng các phần mềm là xu hướng tất yếu. Nhu cầu về các công cụ hỗ trợ trực quan ngày càng cao, nhằm giúp người học dễ dàng tiếp cận và nắm bắt kiến thức một cách hiệu quả. Các khảo sát thực tế cho thấy người dạy và người học có xu hướng tìm kiếm các phần mềm đơn giản, dễ sử dụng nhưng vẫn đảm bảo được tính trực quan và khả năng xử lý dữ liệu linh hoạt.

Với ý tưởng giúp cho học viên có một cách tiếp cận trực quan nhất thông qua dữ liệu máy tính để nhanh chóng lĩnh hội những kiến thức cần thiết và áp dụng vào giải quyết các bài toán thực tế, chúng tôi chọn Excel làm phần mềm minh họa. Excel được lựa chọn không chỉ vì tính phổ biến, dễ sử dụng mà còn do khả năng hỗ trợ mạnh mẽ trong xử lý số liệu và biểu diễn kết quả. Ngoài Excel, hiện nay có nhiều phần mềm miễn phí và phổ biến khác trong giảng dạy xác suất - thống kê như R, Python, hoặc các phần mềm chuyên biệt như SPSS. Mặc dù những phần mềm này có nhiều công cụ phân tích mạnh mẽ, nhưng việc sử dụng chúng đòi hỏi người học phải có kiến thức lập trình hoặc làm quen với giao diện chuyên biệt. Ngược lại, Excel với giao diện thân thiện, có sẵn nhiều công cụ phân tích - xử lý dữ liệu hữu hiệu, ngoài ra Excel còn tích hợp ngôn ngữ lập trình Visual Basic for Applications (VBA) giúp người dùng có thể tạo ra các macro để bổ sung cho Excel nhiều công cụ xử lí các tác vụ phức tạp [1]. Chính vì vậy, VBA trên Excel có thể đóng vai trò như một công cụ bổ trợ hữu ích trong giảng dạy xác suất - thống kê, giúp người học trực tiếp tương tác với dữ liệu một cách linh hoạt.

Bài viết này đưa ra 14 công cụ lập trình bằng VBA. Trong khuôn khổ một bài báo về phương pháp dạy học, chúng tôi không trình bày về lập trình mà cung cấp các công cụ do tác giả viết sẵn dưới dạng các add-in trong tập tin xlam đính kèm và giới thiệu sơ lược cách cài đặt, sử dụng chúng để minh họa cho việc dạy học các nội dung của môn học xác suất - thống kê. Trên tinh thần chia sẻ kết quả nghiên cứu, mã VBA trong các file được cung cấp ở bài viết này đều được mở để người dùng có thể cải biên, chỉnh sửa tùy theo nhu cầu sử dụng.

Link tải các tập tin xlsm: https://byvn.net/2fYA

2. SƠ LƯỢC CÁCH CÀI ĐẶT VÀ THỰC THI ADD-IN

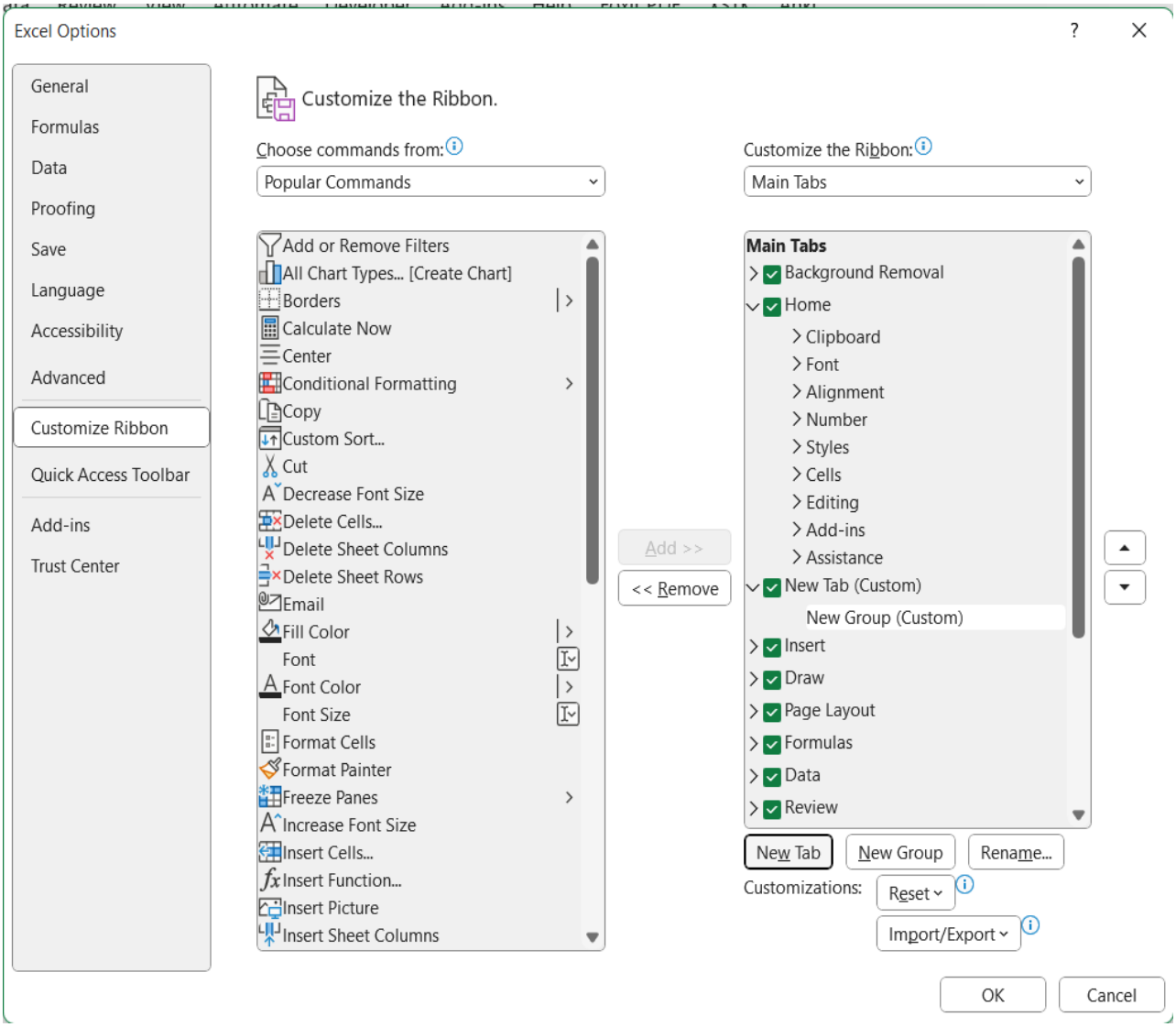
2.1. Mở chặn file add-in

Nhấp chuột phải vào tên file – Properties – General - Unblock – OK, nếu file không bị chặn thì hộp thoại Properties không có nút Unblock.

2.2. Thiết lập Enable VBA macros cho Excel

File – Options – Trust Center – Trust Center Settings… trong mục Macro Settings chọn Enable VBA macros (not recommended; potentially dangerous code can run) – OK.

2.3. Cài add-in và tạo thẻ thực thi cho các công cụ trên thanh Ribon



Hình 1. Tạo New Tab

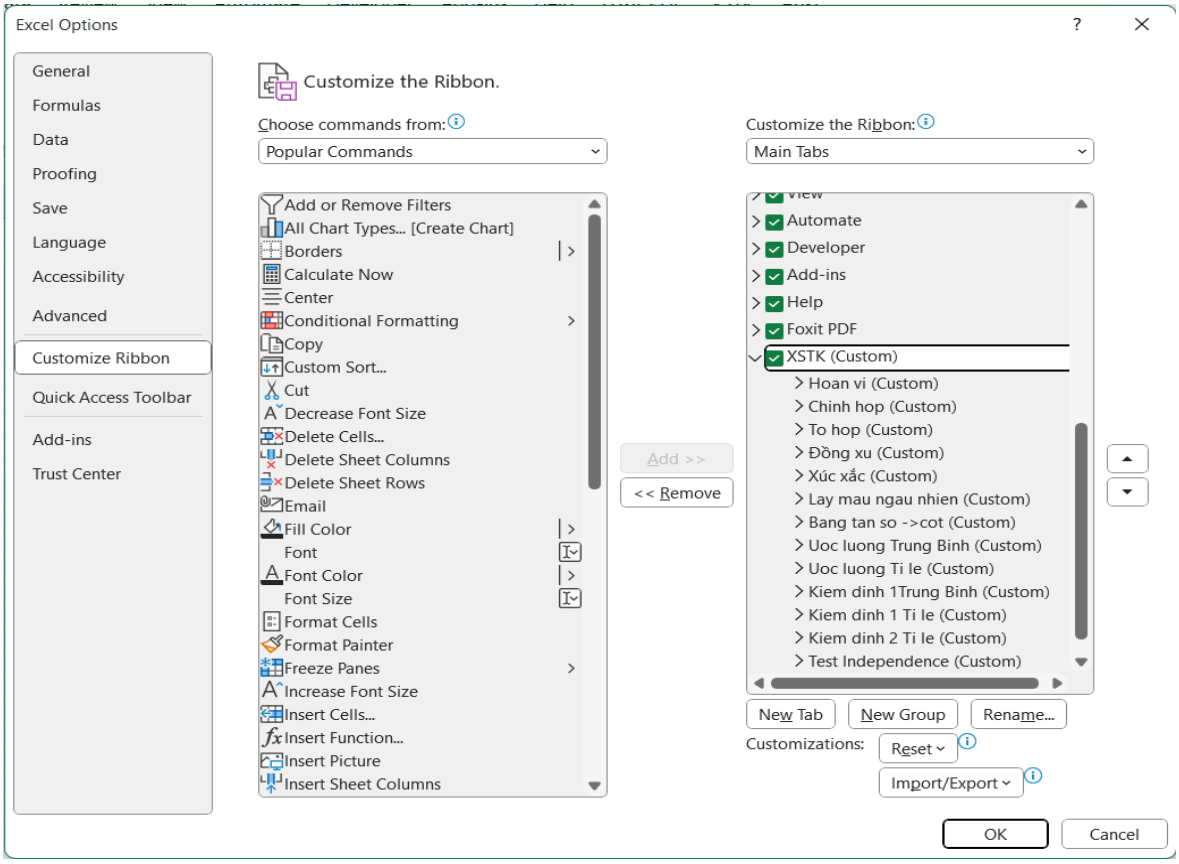
Đổi tên thẻ mẹ New Tab (Custom) thành một tên dễ nhớ chẳng hạn XSTK, thẻ mẹ XSTK này sẽ chứa các thẻ con, mỗi thẻ con tương ứng với một công cụ ta cần chạy. Chọn thẻ con New Group (Custom) đổi tên thành tên gợi nhớ của công cụ thứ nhất, chẳng hạn Hoan vi. Để tạo tiếp các thẻ con trong thẻ mẹ XSTK cho các công cụ còn lại ta chỉ việc chọn New Group và đổi tên. (H. 2).

Chép các file xlam cần cài vào: C:\Users\Admin\AppData\Roaming\Microsoft\AddIns (đường dẫn C:\Users\Admin\ có thể thay đổi tùy theo thư mục cài Excel).

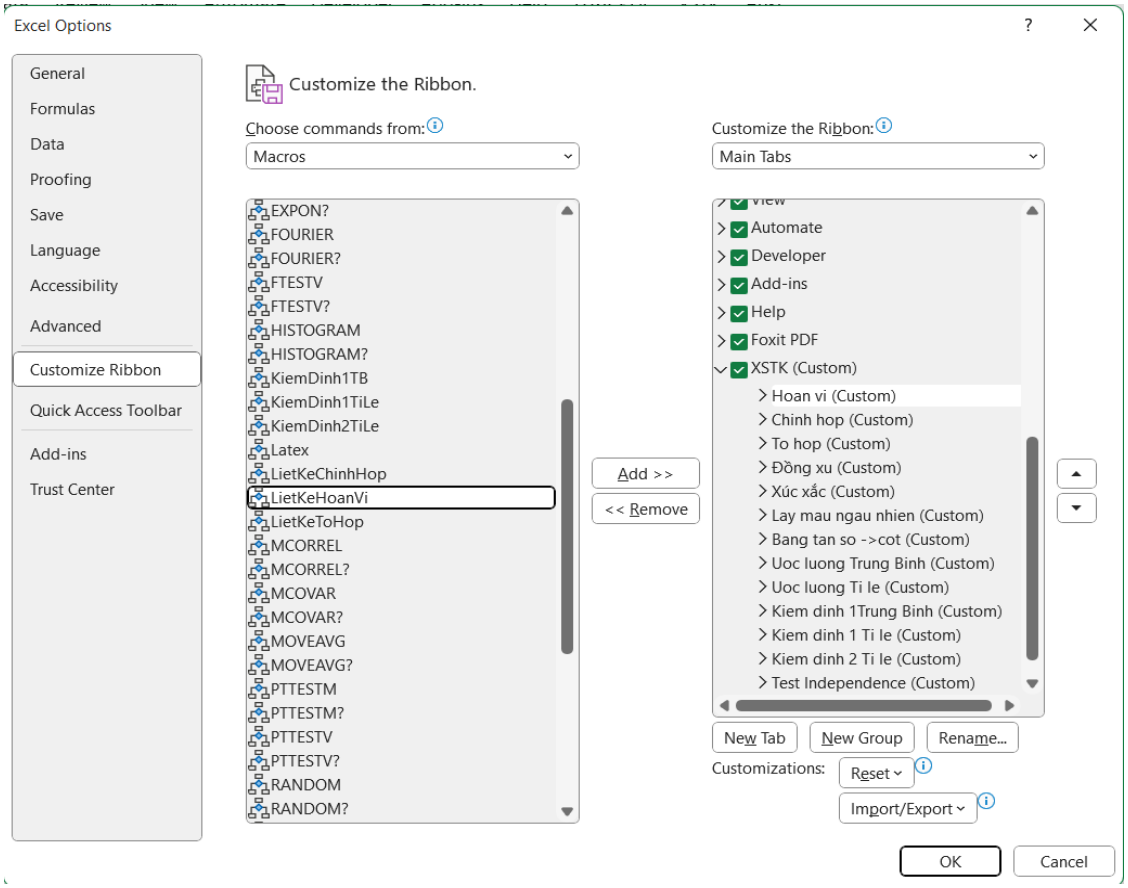
Kích hoạt add-in: File – Option - Add-ins - Go, trong list Add-ins available: check vào add-in đã chép ở bước trên trên rồi chọn OK.

Tạo thẻ thực thi công cụ: File – Options - Customize the Ribbon - New Tab. Excel sẽ tự tạo ra một thẻ mẹ New Tab (Custom) và một thẻ con New Group (Custom) (HÌNH 1).

Tiếp theo để gán chức năng thực thi cho các thẻ con ta chọn từng thẻ một, chẳng hạn thẻ Hoan vi, trong list Choose commands from: chọn Macros, trong danh sách các macro xuất hiện, chọn macro tương ứng (ở đây nó có tên là LietKeHoanVi) gán cho thẻ Hoan vi sau đó chọn Add. Làm tương tự cho tất cả các thẻ con còn lại. (Hình 3)



Hình 2. Tạo, đổi tên Group con



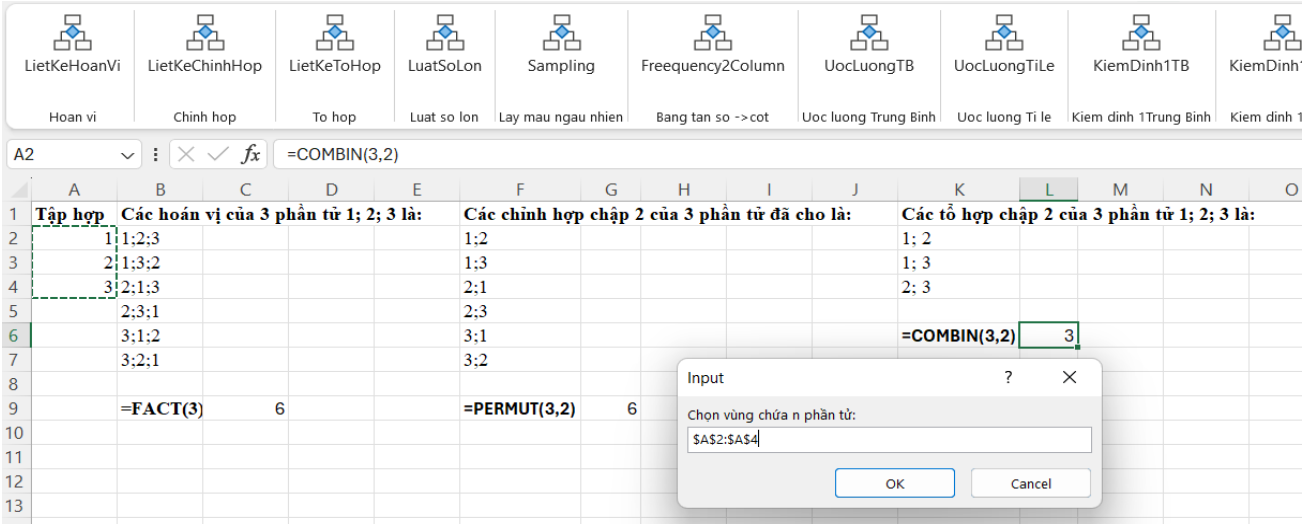
Hình 3. Gán Macro cho các Group

Đến đây chúng ta đã tạo được các thẻ thực thi trên Ribon cho các công cụ đã cài, muốn chạy công cụ nào, chỉ cần chọn thẻ tương ứng.

3. MỘT SỐ CÔNG CỤ MINH HỌA TRONG DẠY HỌC XÁC SUẤT – THỐNG KÊ

3.1. Hoán vị - chỉnh hợp – tổ hợp

Trong Excel có sẵn các hàm FACT(n) trả về giá trị là số hoán vị của một tập hợp n phần tử, hàm PERMUT(n,k) trả về giá trị là số chỉnh hợp chập k của n phần tử và hàm COMBIN(n,k): trả về giá trị là số tổ hợp chập k của n phần tử [2]. Tuy nhiên, các hàm này chỉ đơn thuần đếm số lượng cách kết hợp mà không hiển thị hình thù của mỗi cách kết hợp như thế nào. Để minh họa trực quan, chúng ta dùng các công cụ "LietKeHoanVi, LietKeChinhHop, LietKeToHop". Người dùng nhập n phần tử vào các ô liên tiếp trên một cột của bảng tính, chạy công cụ. Trong hộp thoại Input, người dùng quét chọn n phần tử trên bảng tính và nhập thêm số k (đối với trường hợp liệt kê chỉnh hợp hoặc tổ hợp) sau đó chọn vùng hiện kết quả để chương trình hiển thị các hoán vị, chỉnh hợp, tổ hợp cần liệt kê. Có thể dùng hàm COUNT đếm trực tiếp để đối chiếu với kết quả của các hàm FACT, PERMUT và COMBIN. HÌNH 4 liệt kê các hoán vị, các chỉnh hợp chập 2, các tổ hợp chập 2 của 3 phần tử 1, 2, 3.

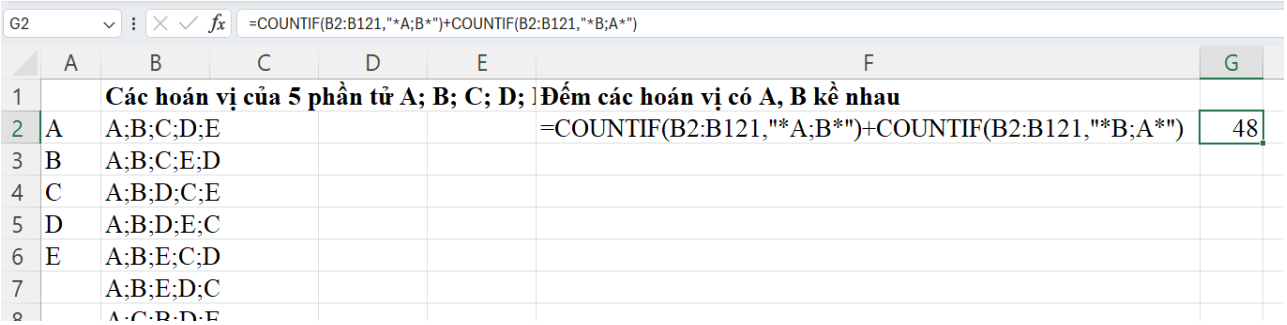


Hình 4. Hoán vị, chỉnh hợp, tổ hợp

Ta xét thêm một ví dụ nhỏ, minh họa cho việc giải một bài toán đếm sau:

Ví dụ 1. Có bao nhiêu cách xếp 5 người A, B, C, D, E vào một bàn dài 4 chỗ ngồi sao cho A và B luôn ngồi cạnh nhau.

Thực hiện: Liệt kê tất cả các hoán vị của 5 phần tử A, B, C, D, E bằng công cụ Lietkehoanvi, dùng hàm COUNTIF [2] đếm số các phần tử chứa chuỗi AB hoặc BA trong vùng chứa các hoán vị được liệt kê (HÌNH 5).



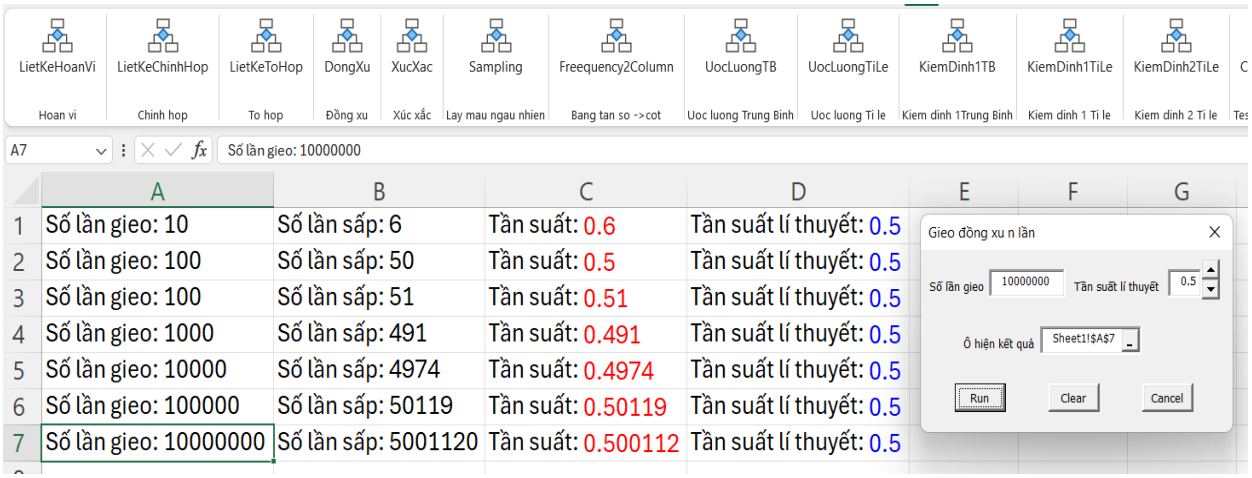
Hình 5. Hàm đếm COUNTF

3.2. Mô phỏng gieo đồng xu trong định nghĩa xác suất theo thống kê và luật số lớn

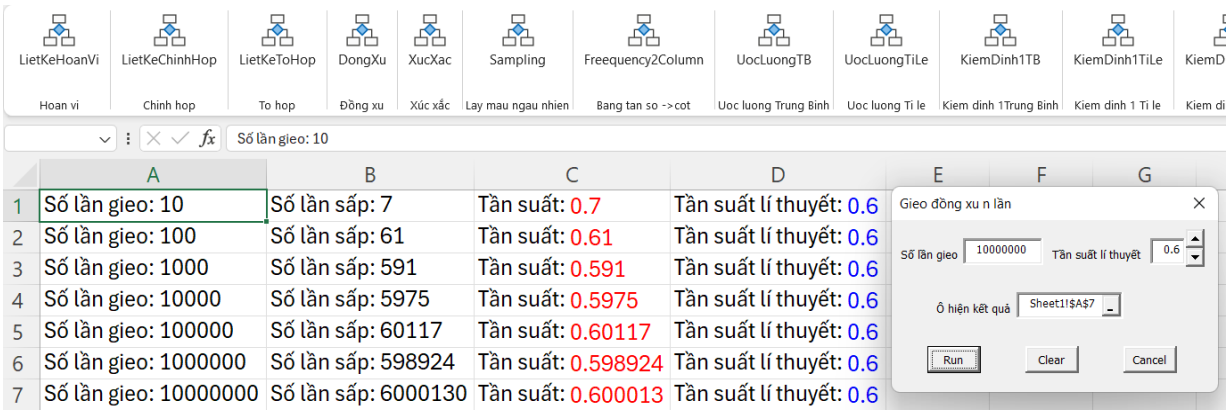
Trong định nghĩa xác suất theo quan điểm thống kê, người ta sử dụng một kết quả của luật số lớn. Theo đó, gọi f là tần suất xuất hiện biến cố ngẫu nhiên A trong n phép thử lặp quan sát A thì f nhận giá trị ngẫu nhiên khi n thay đổi. Tuy nhiên khi n đủ lớn thì giá trị của f dần ổn định, hay f hội tụ về một hằng số [3].

Để mô phỏng cho tính ổn định của tần suất khi n đủ lớn chúng ta dùng công cụ "DongXu", thực hiện gieo đồng xu với input là số lần gieo n và tần suất lí thuyết p. Trường hợp đồng xu cân đối, tần suất lí thuyết được nhập bằng 0,5 (HÌNH

6). Trường hợp đồng xu không cân đối, tần suất lí thuyết được chọn khác 0,5, chẳng hạn 0,6 (HÌNH 7). Kết quả cho thấy với số lần gieo lớn thì tần suất thực nghiệm dần tới tần suất lí thuyết.



Hình 6. Gieo đồng xu cân đối



Hình 7. Gieo đồng xu không cân đối

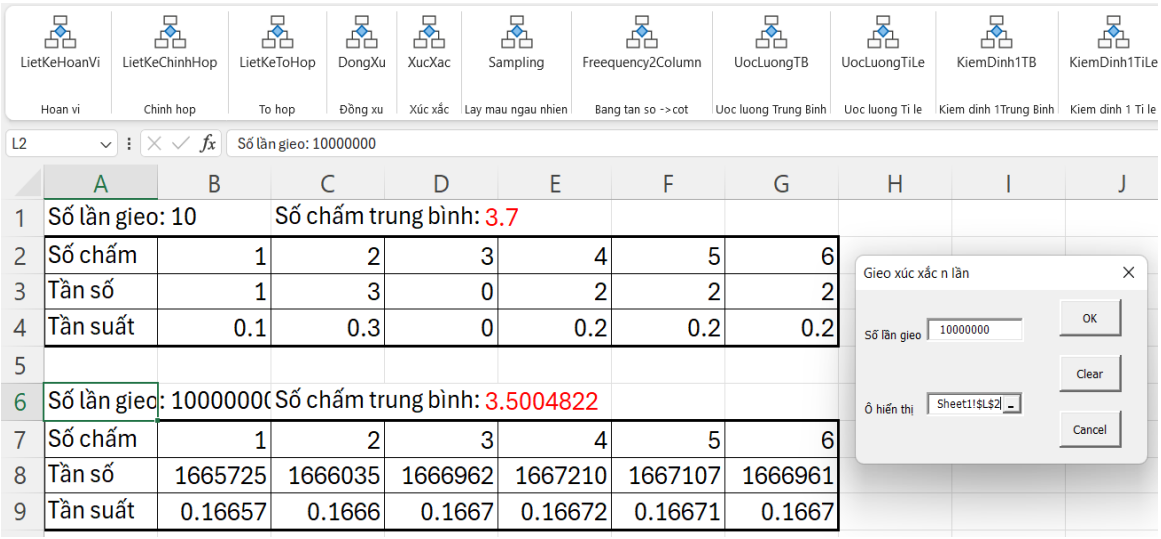
3.3. Mô phỏng gieo xúc xắc, số chấm trung bình, kỳ vọng của biến ngẫu nhiên

Kỳ vọng là giá trị trung bình theo xác suất của biến ngẫu nhiên. Nếu thực hiện n phép thử đo trị số của biến ngẫu nhiên X với n khá lớn thì số trung bình cộng của n trị số này xấp xỉ số kỳ vọng [3]. Để minh họa cho sự hội tụ của dãy giá trị trung bình cộng chúng ta dùng công cụ "XucXac" để mô phỏng gieo xúc xắc với input là số lần gieo n, gọi X là số chấm xuất hiện, kết quả được thể hiện trên một bảng gồm 3 dòng: dòng 1 liệt kê các giá trị mà X có thể nhận, là các số từ 1 đến 6; dòng 2 liệt kê tần số tương ứng của các giá trị (dòng này có thể lược bỏ); dòng 3 liệt kê tần suất tương ứng. Dễ thấy giá trị trung bình của X bằng các số dòng 1 nhân với tần suất tương ứng trên dòng 3 và cộng lại, tức:

$$\overline{X} = \sum_{i=1}^{6} x_i f_i \qquad \overline{X} = \sum_{i=1}^{6} x_i f_i$$

HÌNH 8 thể hiện kết quả cho 2 loạt gieo với số lần giao lần lượt là n = 10 và n = 10000000. Kết quả cho thấy khi n lớn, các giá trị tần suất (dòng 3) đều dần về $\frac{1}{6}$ chính là các xác suất lí thuyết tương ứng nên:

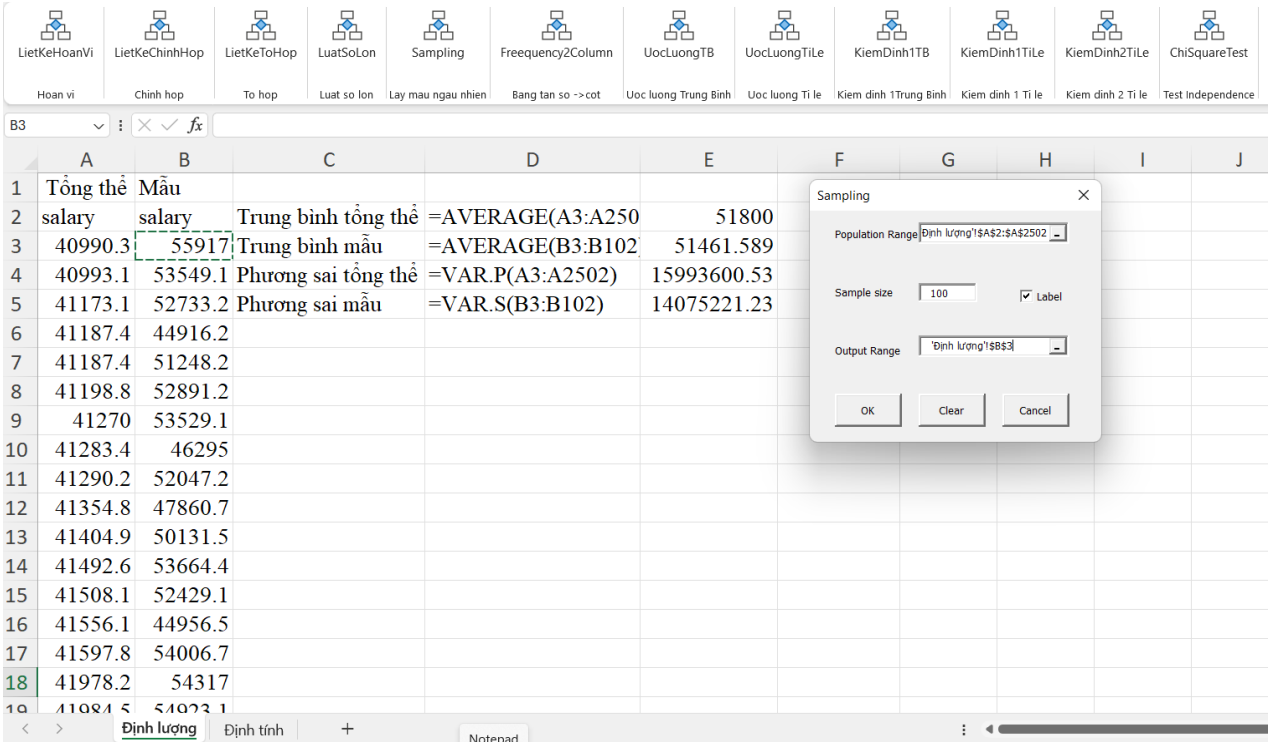
$$\overline{X} = \sum_{i=1}^{6} x_i f_i \to \sum_{i=1}^{6} x_i p_i = 1.\frac{1}{6} + 2.\frac{1}{6} + \ldots + 6.\frac{1}{6}.$$



Hình 8. Số chấm trung bình n lần gieo xúc xắc

3.4. Lấy mẫu ngẫu nhiên

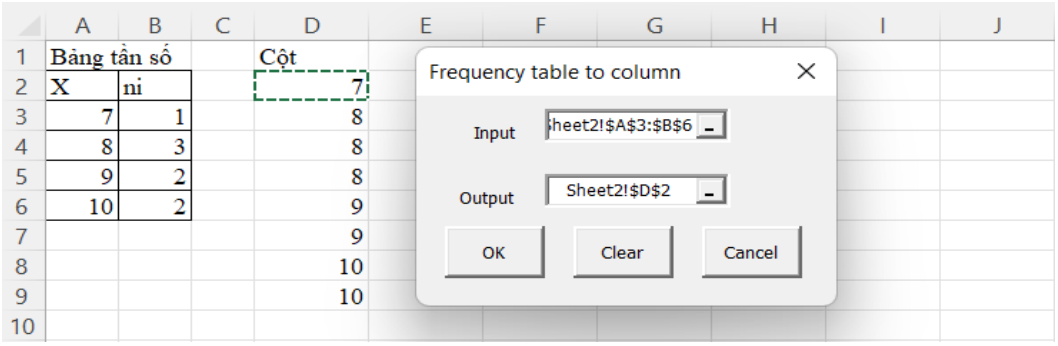
Trong thống kê, tổng thể thường không xác định được chính xác. Tuy nhiên, khi dạy học về mẫu và tổng thể, người dạy có thể minh họa trực quan cho tổng thể bằng một tập dữ liệu xác định bao gồm khá nhiều (hàng nghìn, chục nghìn, trăm nghìn, …) quan sát, mỗi quan sát được ghi trên một dòng. Chọn mẫu ngẫu nhiên cỡ n là chọn n dòng ngẫu nhiên từ các dòng biểu thị cho tổng thể. Ngoài ra cũng cần so sánh các tham số của tổng thể như trung bình, phương sai, tỉ lệ với các đặc trưng tương ứng của mẫu đã chọn. Phần mềm Excel tỏ ra rất phù hợp vì có các hàm tính các giá trị thống kê mô tả của dãy số liệu. Excel còn có công cụ chọn mẫu ngẫu nhiên trong gói Data Analysis thực hiện việc chọn mẫu ngẫu nhiên cho kết quả khá tốt. Một điều đáng tiếc là công cụ chọn mẫu ngẫu nhiên có sẵn của Excel chỉ áp dụng được trên dữ liệu định lượng. Để chọn mẫu ngẫu nhiên được cả cho dấu hiệu định tính chúng ta tạo công cụ mới "Sampling". HÌNH 9 minh họa chọn mẫu ngẫu nhiên dữ liệu định lượng bằng Sampling. Kết quả chọn mẫu ngẫu nhiên cỡ 100 từ tổng thể 2500 phần tử cho thấy sai khác giữa trung bình, phương sai của tổng thể tương ứng với trung bình, phương sai mẫu là khá nhỏ.



Hình 9. Lấy mẫu ngẫu nhiên

3.5. Chuyển bảng tần số thành dãy số liệu cột

Việc chuyển bảng tần số thành dãy số liệu cột có vẻ như ngược với trình tự sắp xếp trình bày số liệu từ một dãy thành bảng trong thống kê, tuy nhiên việc này khá cần thiết bởi các hàm thống kê mô tả trong Excel chỉ nhận đầu vào là một dãy số liệu không sắp tần số trong khi số liệu trong các bài tập thống kê nhiều khi cho bởi bảng tần số. Vì vậy chúng ta tạo công cụ Freequency2Colunm để chuyển một bảng tần số - dữ liệu 2 cột thành một cột. HÌNH 10 minh họa chuyển bảng tần số thành cột bằng Freequency2Colunm.



Hình 10. Chuyển bảng tần số thành dãy số liệu cột

3.6. Ước lượng khoảng

Các hàm CONFIDENDE.NORM(alpha, standard_dev, size) và CONFIDENCE.T(alpha, standard_dev, size) trả về độ chính xác của ước lượng khoảng dùng phân phối chuẩn hoặc phân phối student [2]. Tuy nhiên các hàm này yêu cầu phải nhập vào độ lệch tiêu chuẩn standard_dev, ngoài ra người dùng phải tự xác định trường hợp của bài toán ước lượng để biết áp dụng hàm nào trong hai hàm. Công cụ Descriptive Statistics trong gói Data Analysis của Excel cũng có chức năng tính độ chính xác của ước lượng khoảng cho trung bình tổng thể, tuy vậy nó chỉ được cài đặt cho trường hợp phân phối student. Đối với bài toán ước lượng khoảng cho tỉ lệ tổng thể, Excel hiện nay chưa hỗ trợ. Để giải quyết triệt để bài toán ước lượng khoảng, cho cả trung bình tổng thể và tỉ lệ tổng thể, trong phần này chúng tôi giới thiệu hai công cụ UocLuongTB và UocLuongTL.

Ví dụ 4. Trọng lượng (g) một loại sản phẩm sản xuất hàng loạt là biến ngẫu nhiên X có phân phối chuẩn. Kết quả cân ngẫu nhiên 28 sản phẩm như sau:

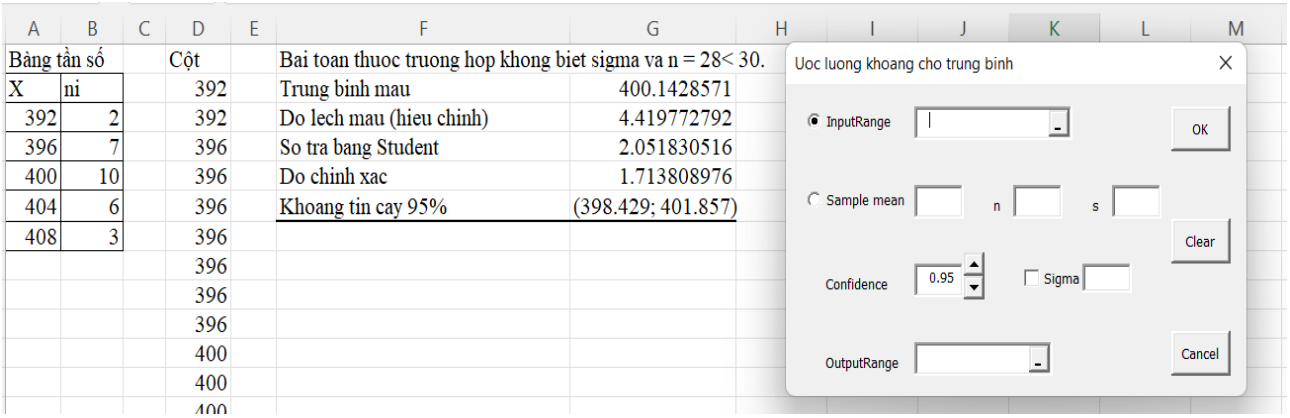
X	392	396	400	404	408
ni	2	7	10	6	3

a) Tìm khoảng tin cậy 95% cho trọng lượng trung bình của một sản phẩm.

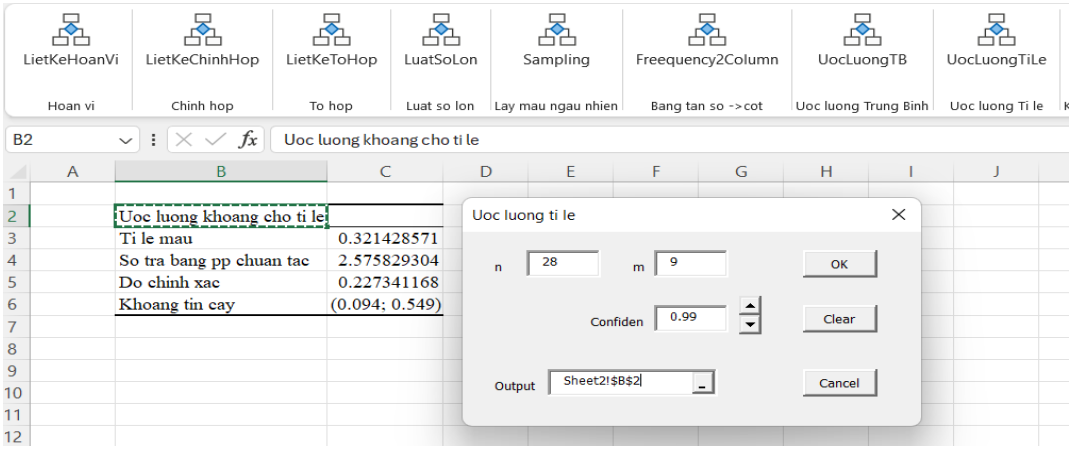
b) Tìm khoảng tin cậy 99% cho tỉ lệ sản phẩm nặng trên 402g.

Thực hiện: a) Nhập bảng tần số, chuyển thành cột, dùng công cụ UocLuongTB (HÌNH 11).

b) Dùng công cụ UocLuongTile (HÌNH 12).



Hình 11. Ước lượng khoảng cho trung bình tổng thể



Hình 12. Ước lượng khoảng cho tỉ lệ tổng thể

3.7. Kiểm định giả thuyết thống kê

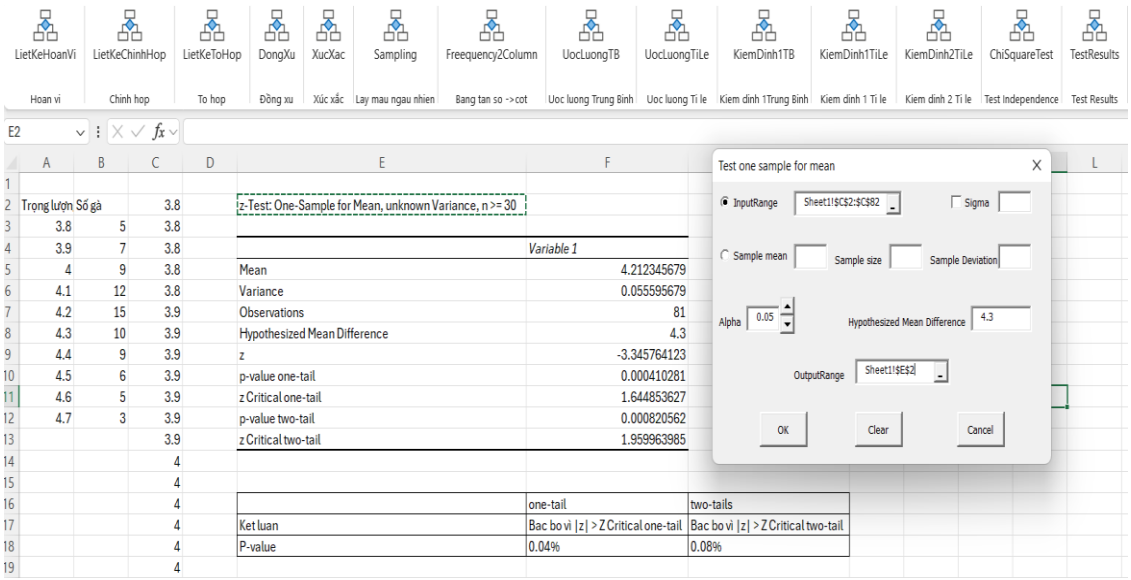
Excel chỉ có sẵn các công cụ kiểm định so sánh hai trung bình, hai phương sai. Ngoài ra, các công cụ kiểm định giả thuyết trên Excel không trực tiếp trả kết quả chấp nhận hay bác bỏ giả thuyết. Để bổ sung, chúng tôi tạo thêm các công cụ sau:

- KiemDinh1TB – kiểm định trung bình một mẫu.
- KiemDinh1TiLe – kiểm định tỉ lệ một mẫu.
- KiemDinh2TiLe – kiểm định tỉ lệ hai mẫu
- ChiSquareTest – kiểm định sự độc lập
- Test Results – đọc kết quả (các kiểm định có sẵn của Excel cũng như công cụ VBA)

Cách dùng các công cụ này khá giống nhau, ta sẽ xét một ví dụ dùng công cụ KiemDinh1TB:

Ví dụ 5. Một trại chăn nuôi gà đã nuôi thí nghiệm bằng khẩu phần thức ăn có bổ sung kháng sinHình Sau một thời gian nuôi, kiểm tra 81 con gà thu được số liệu:

Trọng lượng (g)	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7
Số gà	5	7	9	12	15	10	9	6	5	3



Hình 13. Kiểm định một trung bình

Trại chăn nuôi báo cáo trọng lượng trung bình của những con gà nuôi thí nghiệm là 4,3 gam thì có đúng không với mức ý nghĩa 5%?

Hướng dẫn : dùng công cụ KiemDinh1TB quét vùng dữ liệu cột vào InputRange, nhập Alpha = 0.05, Hypothesized Mean Difference = 4.3, chọn OuputRange hiện kết quả.

Đọc kết quả : TestResults, chọn 1 ô bất kỳ trong vùng chứa kết quả, chọn ô hiện kết quả. HÌNH 13

KẾT LUẬN

Bài báo đã giới thiệu các công cụ minh họa cho nhiều nội dung của môn học xác suất – thống kê. Tiếp tục hướng phát triển công cụ mới bằng VBA Excel, trong tương lai chúng tôi đặt mục tiêu xây dựng những công cụ xử lí thống kê đa dạng hơn để có thể tận dụng Excel như một phần mềm thống kê chuyên dụng. Hi vọng bài báo này là tài liệu tham khảo bổ ích không chỉ cho người dạy xác suất – thống kê mà cả cho những người làm thống kê.

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CHUYỂN ĐỔI SỐ VÀ VẤN ĐỀ ĐẠO ĐỨC TRONG DẠY VÀ HỌC ĐẠI HỌC

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TÓM TẮT

Chuyển đổi số đang tác động mạnh mẽ đến hệ thống giáo dục đại học, thúc đẩy việc nâng cao chất lượng giảng dạy và học tập. Tuy nhiên, nghiên cứu chỉ ra rằng nó cũng đặt ra những vấn đề đạo đức cần được giải quyết để bảo đảm sự phát triển bền vững, nổi bật là: Quyền riêng tư, công bằng, minh bạch và trách nhiệm của các bên liên quan trong giáo dục đại học. Thách thức lớn nhất là bảo vệ quyền riêng tư về dữ liệu của người học thông qua các nền tảng số. Nghiên cứu cho thấy, người học ở vùng khó khăn và các sinh viên có hoàn cảnh đặc biệt khó tiếp cận giáo dục số một cách bình đẳng. Hơn nữa, giảng dạy và đánh giá trực tuyến có thể gia tăng gian lận về học thuật, nên cần có sự minh bạch và giải pháp giám sát hiệu quả. Do đó, việc xây dựng khung đạo đức số toàn diện: Quy tắc ứng xử, đào tạo nhận thức cho giảng viên và người học, cùng với việc sử dụng công nghệ giám sát và bảo đảm tuân thủ. Đó là cơ sở để đảm bảo chuyển đổi số vừa mang lại hiệu quả vừa mang lại giá trị nhân văn trong giáo dục đại học

Từ khóa: Chuyển đổi số, dạy và học đại học, đạo đức, giáo dục đại học.

I. TỔNG QUAN

Chuyển đổi số đang mở ra một kỷ nguyên mới cho giáo dục đại học, mang đến những tiềm năng to lớn trong việc nâng cao chất lượng giảng dạy, mở rộng cơ hội học tập và tối ưu hóa quản lý. Tuy nhiên, cùng với những lợi ích đó, sự phát triển nhanh chóng của công nghệ cũng đặt ra nhiều thách thức đạo đức cấp bách. Các vấn đề như bảo vệ quyền riêng tư dữ liệu của người học, đảm bảo công bằng trong việc tiếp cận và sử dụng công nghệ giáo dục, ngăn chặn gian lận học thuật trong môi trường số, và xác định rõ trách nhiệm của các bên liên quan, đòi hỏi sự quan tâm đặc biệt. Nếu không có các chính sách và quy định phù hợp để giải quyết những vấn đề này, chất lượng giáo dục đại học có thể bị ảnh hưởng tiêu cực, làm xói mòn các giá trị cốt lõi của môi trường học thuật, và gây ra những hệ lụy khó lường cho xã hội.

2. PHƯƠNG PHÁP

Bài viết này tiếp cận vấn đề từ phân tích tài liệu lý thuyết, các thông tin đã được công bố, nhằm làm sáng tỏ các vấn đề đạo đức phát sinh từ quá trình chuyển đổi số trong giáo dục đại học, đánh giá tác động của vấn đề này đến chất lượng đào tạo, và đề xuất các giải pháp khả thi để đảm bảo tính công bằng, minh bạch, và bền vững trong môi trường số. Các giải pháp đề xuất được xây dựng dựa trên sự phân tích kỹ lưỡng các khuyến nghị của các chuyên gia giáo dục, các tổ chức quốc tế, và kinh nghiệm thực tiễn từ các trường đại học tiên phong trong việc áp dụng công nghệ số

3.1. KẾT QUẢ VÀ THẢO LUẬN

3.1. Đạo đức trong việc sử dụng dữ liệu số

Trong quá trình chuyển đổi số, việc thu thập, lưu trữ và sử dụng dữ liệu số của sinh viên và giảng viên trở thành một vấn đề quan trọng, đặt ra nhiều thách thức về đạo đức và bảo mật. Các nền tảng học tập trực tuyến, hệ thống quản lý học tập (LMS) và trí tuệ nhân tạo (AI) ngày càng thu thập lượng lớn dữ liệu cá nhân, từ thông tin nhân thân, điểm số, lịch sử học tập đến hành vi trực tuyến của người học (Tổng cục Giáo dục nghề nghiệp, 2020; Le, H., 2024). Nếu không có các biện pháp kiểm soát phù hợp, dữ liệu này có thể bị lạm dụng cho mục đích thương mại, giám sát quá mức hoặc rò rỉ, gây ảnh hưởng tiêu cực đến quyền riêng tư của người dùng.

Vấn đề quan trọng khác là tính minh bạch trong việc sử dụng dữ liệu. Sinh viên cần được thông báo rõ ràng về cách dữ liệu của họ được thu thập và sử dụng. Bên cạnh đó, các trường đại học cần có chính sách bảo vệ dữ liệu chặt chẽ, đảm bảo rằng thông tin cá nhân chỉ được sử dụng cho mục đích giáo dục và không bị khai thác trái phép. Để duy trì đạo đức trong sử dụng dữ liệu số, cần có sự phối hợp giữa các bên liên quan: Nhà trường, giảng viên và sinh viên, nhằm thiết lập các tiêu chuẩn bảo mật phù hợp và bảo vệ quyền lợi của người.

3.2. Sự công bằng trong tiếp cận công nghệ

Trong giáo dục đại học, chuyển đổi số mang lại nhiều lợi ích nhưng cũng làm gia tăng khoảng cách số giữa các sinh viên do sự chênh lệch về điều kiện tiếp cận công nghệ. Sinh viên ở khu vực thành thị thường có cơ hội sử dụng các thiết bị hiện đại, kết nối internet tốc độ cao và được tiếp cận với các nền tảng học tập tiên tiến. Ngược lại, sinh viên ở vùng nông thôn, vùng sâu vùng xa hoặc ở các địa phương có điều kiện kinh tế khó khăn có thể gặp nhiều trở ngại trong việc tiếp cận công nghệ, từ thiếu thiết bị học tập (máy tính, điện thoại thông minh) đến mạng internet không ổn định (Việt, C., 2024). Điều này tạo ra sự bất bình đẳng trong cơ hội học tập, ảnh hưởng đến chất lượng giáo dục và khả năng tiếp thu của sinh viên.

Mặt khác, khả năng sử dụng công nghệ số của sinh viên và giảng viên cũng không đồng đều. Một số sinh viên có kỹ năng số tốt, dễ dàng tiếp cận và khai thác tài nguyên học tập trực tuyến, trong khi những sinh viên khác có thể gặp khó khăn do thiếu kiến thức và kinh nghiệm sử dụng các công cụ số (Huyên, N., 2023). Để đảm bảo sự công bằng trong vấn đề này, các trường đại học cần có chính sách hỗ trợ sinh viên khó khăn: Cung cấp thiết bị học tập, hỗ trợ tài chính hoặc mở các khóa đào tạo kỹ năng số. Ngoài ra, cần đầu tư hạ tầng công nghệ đồng bộ, giúp giảm thiểu khoảng cách số và tạo ra môi trường học tập bình đẳng cho tất cả sinh viên.

3.3. Đạo đức trong đánh giá và thi cử trực tuyến

Chuyển đổi số đã làm thay đổi phương thức đánh giá và thi cử trong giáo dục đại học, giúp việc kiểm tra trở nên linh hoạt và thuận tiện hơn (Tường, S., 2024). Tuy nhiên, hình thức thi trực tuyến cũng đặt ra nhiều thách thức về đạo đức, đặc biệt là vấn đề gian lận học thuật (Văn, H., 2022; Lê, H., 2022). Sinh viên có thể sử dụng tài liệu, công cụ hỗ trợ hoặc thậm chí nhờ người khác làm bài thay mà không bị giám sát chặt chẽ như thi trực tiếp. Điều này làm suy giảm tính công bằng và chính xác trong đánh giá kết quả học tập.

Song, một số nền tảng thi trực tuyến có thể vi phạm quyền riêng tư khi yêu cầu sinh viên bật webcam, ghi hình hoặc thu thập dữ liệu cá nhân trong quá trình làm bài (Liên, H., 2018). Nếu không có quy định rõ ràng về bảo mật, thông tin cá nhân có thể bị lạm dụng hoặc rò rỉ. Để đảm bảo đạo đức trong đánh giá trực tuyến, các trường đại học cần áp dụng công nghệ giám sát thi cử phù hợp, kết hợp với những phương pháp đánh giá khác: Bài luận, dự án hoặc phỏng vấn trực tuyến. Đồng thời, cần nâng cao nhận thức của sinh viên về đạo đức học thuật để đảm bảo tính trung thực trong môi trường học tập số.

3.4. Trách nhiệm đạo đức của các bên liên quan

Trong quá trình chuyển đổi số giáo dục đại học, trách nhiệm đạo đức không chỉ thuộc về nhà trường mà còn liên quan đến giảng viên, sinh viên và các nhà cung cấp công nghệ. Mỗi bên cần đảm bảo thực hiện đúng vai trò của mình để duy trì môi trường học tập công bằng, minh bạch và hiệu quả.

Nhà trường: Xây dựng quy định bảo vệ dữ liệu cá nhân, đảm bảo quyền riêng tư và công bằng trong tiếp cận công nghệ. Đồng thời, nhà trường cũng cần quy định rõ ràng về đạo đức học thuật, đặc biệt trong thi cử và đánh giá trực tuyến.

Giảng viên: Phải đảm bảo tính công bằng trong giảng dạy, sử dụng công nghệ một cách có đạo đức và hỗ trợ sinh viên nâng cao kỹ năng số.

Sinh viên: Cần tuân thủ quy tắc đạo đức học thuật, trung thực trong thi cử và bảo vệ dữ liệu cá nhân của mình.

Các nhà cung cấp công nghệ: Có trách nhiệm thiết kế hệ thống bảo mật, minh bạch trong việc thu thập và sử dụng dữ liệu.

Sự phối hợp chặt chẽ giữa các bên sẽ giúp việc chuyển đổi số trong giáo dục diễn ra theo hướng bền vững, công bằng và có đạo đức.

3.5. Một số giải pháp

Chuyển đổi số giáo dục đại học mang lại nhiều lợi ích nhưng cũng đặt ra thách thức về đạo đức. Để đảm bảo tính công bằng, minh bạch và bảo vệ quyền lợi của các bên liên quan, cần có những giải pháp toàn diện từ việc xây dựng khung đạo đức đến ứng dụng công nghệ và hợp tác quốc tế.

Một là: Xây dựng khung đạo đức số cho giáo dục đại học

Việc thiết lập một khung đạo đức số giúp định hướng hành vi và trách nhiệm của giảng viên, sinh viên cũng như các

tổ chức giáo dục trong môi trường số hóa. Trong đó, hai yếu tố quan trọng cần được nhấn mạnh là:

– Quy tắc ứng xử về bảo mật thông tin cá nhân: Trường đại học cần ban hành quy định cụ thể về bảo vệ dữ liệu cá nhân, đảm bảo thông tin của sinh viên và giảng viên không bị thu thập, lưu trữ hoặc sử dụng trái phép. Điều này bao gồm việc kiểm soát truy cập vào hệ thống quản lý học tập (LMS), yêu cầu sự minh bạch trong thu thập dữ liệu, và cung cấp quyền từ chối chia sẻ thông tin cá nhân.

– Tiêu chuẩn công bằng trong học tập và giảng dạy: Cần có quy chế rõ ràng về đánh giá trực tuyến, đảm bảo sinh viên ở mọi hoàn cảnh đều có cơ hội tiếp cận công bằng với công nghệ số. Đồng thời, giảng viên cần được hướng dẫn về đạo đức giảng dạy trong môi trường số, tránh các hành vi thiên vị hoặc lợi dụng công nghệ để gây bất lợi cho sinh viên.

Hai là: Nâng cao nhận thức về đạo đức số

Nhận thức về đạo đức số còn hạn chế trong cộng đồng học thuật. Do đó, các trường đại học cần thực hiện:

– Tổ chức các khóa học hoặc hội thảo về đạo đức số cho giảng viên và sinh viên: Các hoạt động này sẽ giúp giảng viên và sinh viên hiểu rõ về quyền và trách nhiệm trong môi trường số, từ việc bảo vệ dữ liệu cá nhân đến thực hiện các quy tắc đạo đức trong học tập và giảng dạy.

– Xây dựng tài liệu hướng dẫn và bộ quy tắc mẫu dành cho giảng viên, sinh viên và cán bộ quản lý giáo dục, làm cơ sở cho việc xử lý các vấn đề đạo đức trong chuyển đổi số. Các tài liệu này cần được phổ biến rộng rãi và cập nhật thường xuyên theo yêu cầu phát triển của công nghệ.

Ba là: Ứng dụng công nghệ trong quản trị đạo đức

Công nghệ có thể được sử dụng để giám sát và bảo đảm tính minh bạch trong giáo dục đại học:

– Sử dụng AI và dữ liệu lớn để giám sát và ngăn chặn vi phạm đạo đức: AI có thể hỗ trợ phát hiện hành vi gian lận trong thi cử trực tuyến, phân tích dữ liệu để nhận diện các xu hướng vi phạm đạo đức, từ đó đưa ra cảnh báo kịp thời. Bên cạnh đó, dữ liệu lớn có thể được sử dụng để giám sát chất lượng giảng dạy, giúp đảm bảo rằng các tiêu chuẩn đạo đức được duy trì trong toàn bộ hệ thống giáo dục.

– Phát triển các công cụ kiểm tra đạo đức học thuật: Các phần mềm kiểm tra đạo văn, phát hiện gian lận thi cử và đánh giá tính trung thực trong bài làm của sinh viên. Các công cụ này cần được tích hợp vào hệ thống LMS để giảng viên có thể dễ dàng sử dụng trong quá trình giảng dạy và đánh giá.

Bốn là: Tăng cường hợp tác quốc tế

Đạo đức trong chuyển đổi số không chỉ là vấn đề riêng của một quốc gia mà là thách thức chung trên toàn cầu. Vì vậy, Việt Nam cần học hỏi và áp dụng các mô hình đạo đức số từ các quốc gia tiên tiến:

– Tham khảo và áp dụng các kinh nghiệm quốc tế trong quản lý đạo đức số: Nhiều nước đã xây dựng các khung pháp lý và quy tắc đạo đức chi tiết để bảo vệ quyền riêng tư và đảm bảo công bằng trong giáo dục số. Việt Nam có thể tham khảo các mô hình này để xây dựng hệ thống phù hợp với điều kiện trong nước.

– Tích hợp các tiêu chuẩn toàn cầu vào bối cảnh giáo dục đại học Việt Nam: Các tổ chức giáo dục quốc tế như UNESCO, OECD đã có những hướng dẫn về đạo đức trong giáo dục số. Việc tham gia vào các diễn đàn học thuật quốc tế sẽ giúp Việt Nam tiếp cận với những tiêu chuẩn toàn cầu và điều chỉnh phù hợp với bối cảnh của mình.

4. KẾT LUẬN

Chuyển đổi số trong giáo dục đại học mang lại nhiều cơ hội đổi mới phương pháp giảng dạy, nâng cao chất lượng học tập và mở rộng khả năng tiếp cận tri thức. Tuy nhiên, quá trình này cũng đặt ra nhiều thách thức về đạo đức, đặc biệt là các vấn đề liên quan đến bảo mật dữ liệu cá nhân, công bằng trong tiếp cận công nghệ, gian lận học thuật và trách nhiệm của các bên liên quan. Nếu không có các biện pháp kiểm soát và hướng dẫn phù hợp, những rủi ro này có thể ảnh hưởng tiêu cực đến tính minh bạch và chất lượng giáo dục.

Để đảm bảo môi trường giáo dục số có đạo đức, cần có sự phối hợp chặt chẽ giữa nhà trường, giảng viên, sinh viên và các đơn vị cung cấp công nghệ. Việc xây dựng khung đạo đức số, nâng cao nhận thức, ứng dụng công nghệ vào quản trị đạo đức và học hỏi kinh nghiệm quốc tế sẽ giúp giảm thiểu những tác động tiêu cực của chuyển đổi số. Khi các nguyên tắc đạo đức được duy trì và áp dụng hiệu quả, giáo dục đại học sẽ phát triển bền vững, đảm bảo công bằng và trách nhiệm trong thời đại số hóa.

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THANH TOÁN KHÔNG DÙNG TIỀN MẶT TẠI VIỆT NAM: CƠ HỘI VÀ THÁCH THỨC

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TÓM TẮT

Xu hướng chuyển đổi sang thanh toán không dùng tiền mặt đang tạo ra những tác động sâu rộng đến nền kinh tế, đặc biệt tại các quốc gia đang phát triển như Việt Nam. Bài viết này phân tích cơ hội và thách thức liên quan đến việc áp dụng thanh toán không dùng tiền mặt tại Việt Nam. Thông qua việc tổng hợp tài liệu và phân tích dữ liệu mới nhất, nghiên cứu làm nổi bật những lợi ích kinh tế như tăng cường tiếp cận tài chính, giảm chi phí giao dịch, và nâng cao tính minh bạch. Đồng thời, bài viết cũng xác định các thách thức lớn, bao gồm hạn chế về công nghệ, vấn đề bảo mật dữ liệu, và sự chênh lệch trong khả năng tiếp cận dịch vụ. Kết luận đưa ra các khuyến nghị nhằm cải thiện chính sách và hạ tầng để thúc đẩy quá trình chuyển đổi này tại Việt Nam.

Từ khóa: Cơ hội, Fintech, kinh tế số, thách thức, thanh toán không dùng tiền mặt, Việt Nam

1. ĐẶT VẤN ĐỀ

Thanh toán không dùng tiền mặt đang trở thành xu hướng toàn cầu, đóng vai trò quan trọng trong việc hiện đại hóa kinh tế và nâng cao khả năng cạnh tranh quốc gia. Tại Việt Nam, sự phát triển mạnh mẽ của các công ty Fintech và hạ tầng công nghệ đã thúc đẩy quá trình này, nhưng đồng thời cũng đặt ra những thách thức về hạ tầng và nhận thức cộng đồng. Nghiên cứu này tập trung phân tích các cơ hội nổi bật và đánh giá những thách thức trong quá trình triển khai thanh toán không dùng tiền mặt tại Việt Nam. Mặc dù đã có nhiều nghiên cứu về lĩnh vực này, vẫn còn thiếu các phân tích chuyên sâu về tác động và chiến lược triển khai trong bối cảnh chuyển đổi nhanh chóng của khu vực và quốc tế. Nghiên cứu trả lời hai câu hỏi chính: Những cơ hội nào đang thúc đẩy áp dụng thanh toán không dùng tiền mặt tại Việt Nam? Những thách thức nào cần được giải quyết để đảm bảo quá trình này đạt hiệu quả cao nhất?

2. PHƯƠNG PHÁP NGHIÊN CỨU

Nghiên cứu này sử dụng phương pháp tổng hợp tài liệu, kết hợp với phân tích định tính từ báo cáo tài chính và khảo sát của các tổ chức như Ngân hàng Nhà nước, PwC, và World Bank. Phạm vi nghiên cứu tập trung vào giai đoạn 2018–2023, với dữ liệu chủ yếu từ các thành phố lớn như Hà Nội và TP.HCM.

3. KẾT QUẢ NGHIÊN CỨU

3.1. Cơ sở lý thuyết

3.1.1. Cơ sở lý thuyết về thanh toán không dùng tiền mặt

Thanh toán không dùng tiền mặt (TTKDTM) được hiểu là việc thực hiện các giao dịch tài chính mà không sử dụng tiền mặt vật lý, thay vào đó là các phương tiện thanh toán điện tử như thẻ ngân hàng, ví điện tử, chuyển khoản, mã QR hoặc các hình thức thanh toán số khác. Theo Ngân hàng Thế giới (World Bank, 2021), TTKDTM đóng vai trò then chốt trong việc hiện đại hóa hệ thống tài chính và thúc đẩy tài chính toàn diện, đặc biệt tại các quốc gia đang phát triển.

Việc áp dụng TTKDTM được lý giải thông qua Mô hình chấp nhận công nghệ (Technology Acceptance Model - TAM) của Davis (1989), cho rằng hai yếu tố "nhận thức về tính hữu ích" và "nhận thức về sự dễ sử dụng" quyết định việc người dùng có sẵn sàng chấp nhận công nghệ hay không. Mô hình này thường được sử dụng để phân tích hành vi chấp nhận các công nghệ thanh toán mới.

3.1.2. Cơ sở lý thuyết về thanh toán số

Thanh toán số là một thành phần của hệ sinh thái tài chính số, liên quan đến việc sử dụng các thiết bị số và nền tảng trực tuyến để xử lý giao dịch. Rogers (2003), trong "Thuyết lan truyền đổi mới" (Diffusion of Innovations), chỉ ra rằng sự lan truyền của công nghệ phụ thuộc vào các yếu tố như tính ưu việt tương đối, mức độ tương thích, sự phức tạp, khả năng thử nghiệm và quan sát được. Những yếu tố này ảnh hưởng trực tiếp đến tốc độ và phạm vi chấp nhận thanh toán

số trong cộng đồng.

Trong bối cảnh chuyển đổi số hiện nay, thanh toán số không chỉ mang ý nghĩa công nghệ mà còn gắn liền với các mục tiêu phát triển bền vững như tăng trưởng bao trùm, giảm bất bình đẳng và tăng cường năng lực cạnh tranh quốc gia.

3.1.3. Vai trò của thanh toán không dùng tiền mặt hiện nay

TTKDTM giữ vai trò quan trọng trong việc thúc đẩy tăng trưởng kinh tế, nâng cao hiệu quả quản lý tài chính công và cải thiện trải nghiệm của người tiêu dùng. Theo Arvidsson (2019), một xã hội không dùng tiền mặt giúp giảm chi phí vận hành nền kinh tế, tăng tính minh bạch trong các hoạt động tài chính, đồng thời tạo điều kiện phát triển các dịch vụ tài chính sáng tạo. Ngoài ra, việc phát triển TTKDTM còn gắn liền với sự phát triển của các công nghệ mới như blockchain, trí tuệ nhân tạo (AI) và dữ liệu lớn (Big Data), mở ra tiềm năng to lớn cho ngành tài chính trong tương lai.

3.2. Cơ hội

3.2.1. Thúc đẩy kinh tế số

Thanh toán không dùng tiền mặt (TTKDTM) đóng vai trò then chốt trong tiến trình phát triển nền kinh tế số tại Việt Nam. Theo Ngân hàng Nhà nước Việt Nam (2023), giai đoạn 2018–2023, tổng giá trị giao dịch qua nền tảng điện tử tăng trung bình 85% mỗi năm, đạt hơn 14.000 tỷ đồng vào năm 2023. Với đà này, nếu duy trì tốc độ tăng trưởng hiện tại, giá trị giao dịch có thể vượt 50.000 tỷ đồng vào năm 2030.

Các công ty Fintech tại Việt Nam cũng nhận được trên 600 triệu USD vốn đầu tư quốc tế chỉ riêng năm 2022. TTKDTM không chỉ thúc đẩy thương mại điện tử (TMĐT) – với mức tăng trưởng doanh thu 25% năm 2022 (Statista, 2023) – mà còn tạo ra hàng nghìn việc làm trong các lĩnh vực liên quan đến công nghệ, dữ liệu và dịch vụ thanh toán.

3.2.2. Tăng cường tiếp cận tài chính

Theo World Bank (2021), tỷ lệ người không có tài khoản ngân hàng ở Việt Nam giảm từ 30% (2018) xuống còn 22% (2023), chủ yếu nhờ các ví điện tử như MoMo, ZaloPay và ViettelPay. Nếu được hỗ trợ bởi chính sách khuyến khích và hạ tầng đồng bộ, Việt Nam có thể đưa tỷ lệ này về dưới 10% vào năm 2030.

Việc mở rộng các dịch vụ ngân hàng số và ví điện tử giúp tài chính toàn diện lan tỏa mạnh mẽ đến các khu vực vùng sâu vùng xa, góp phần thu hẹp khoảng cách giàu nghèo và thúc đẩy bình đẳng trong tiếp cận dịch vụ tài chính.

3.2.3. Giảm chi phí giao dịch

TTKDTM giúp giảm mạnh chi phí liên quan đến in ấn, vận chuyển và lưu trữ tiền mặt. Theo thống kê của Ngân hàng Nhà nước (2023), giao dịch qua ví điện tử giúp tiết kiệm hơn 1,5 tỷ USD/năm cho nền kinh tế. Nếu xu hướng này tiếp tục, con số tiết kiệm có thể vượt mức 5 tỷ USD vào năm 2030.

Chi phí mỗi giao dịch qua ví điện tử hiện tại chỉ chiếm 0,3% tổng giá trị – thấp hơn 60% so với phương thức thanh toán truyền thống – điều này tạo điều kiện thuận lợi cho người tiêu dùng và các doanh nghiệp, nhất là trong TMĐT.

3.2.4. Minh bạch hóa hoạt động tài chính

Các hệ thống TTKDTM có khả năng truy vết giao dịch tốt, giúp giảm 35% tỷ lệ gian lận tài chính so với năm 2018 (PwC, 2022). Việc ứng dụng công nghệ như blockchain và AI còn giúp Nhà nước thu hồi hiệu quả hơn các khoản thất thu thuế – riêng năm 2023, ước tính trên 8.000 tỷ đồng đã được truy thu nhờ công nghệ giám sát giao dịch số.

3.3. Thách thức

3.3.1. Hạ tầng công nghệ chưa đồng bộ

Hiện tại, hơn 40% khu vực nông thôn Việt Nam chưa có kết nối Internet ổn định (Ngân hàng Nhà nước, 2023). Việc triển khai POS, hệ thống ngân hàng lõi và các điểm thanh toán ở vùng sâu vùng xa vẫn còn hạn chế do chi phí đầu tư cao.

Dù có nhiều chính sách khuyến khích, nhưng báo cáo của Ernst & Young (2023) chỉ ra rằng mức sinh lời chưa đủ hấp dẫn khiến nhiều Fintech e dè trong việc mở rộng ra các khu vực khó tiếp cận.

3.3.2. Thiếu kỹ năng số trong dân cư

Chỉ khoảng 45% người dân Việt Nam hiện có khả năng sử dụng thành thạo các công cụ thanh toán số (World Bank, 2021). Tỷ lệ này đặc biệt thấp ở nhóm trên 50 tuổi và người lao động tại nông thôn. Nếu không có chương trình phổ cập kỹ năng số phù hợp, điều này sẽ làm gia tăng bất bình đẳng trong chuyển đổi tài chính số.

3.3.3. Rủi ro bảo mật ngày càng phức tạp

Việt Nam là một trong những quốc gia chịu ảnh hưởng nặng nề từ tấn công mạng trong khu vực Đông Nam Á. Theo Kaspersky (2022), năm 2022 ghi nhận trên 18 triệu vụ tấn công mạng nhắm vào các hệ thống tài chính. Người dùng vẫn còn e ngại về việc bị rò rỉ thông tin và lừa đảo.

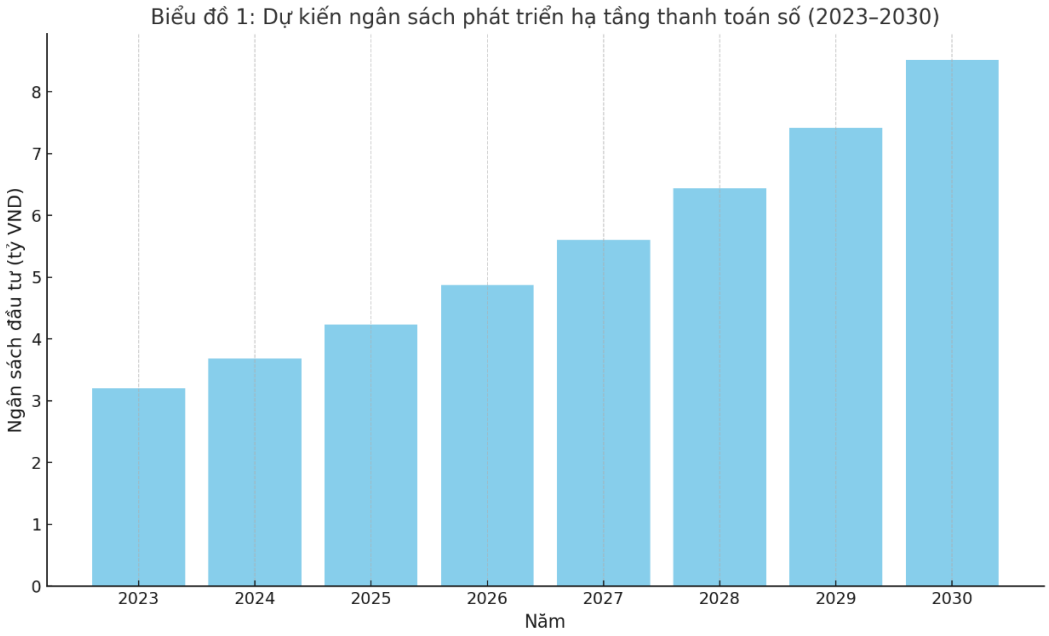
Mục tiêu đến 2030 cần giảm ít nhất 15% số vụ mỗi năm, hướng đến con số dưới 5 triệu vụ tấn công vào năm 2030 – đồng thời nâng mức độ tin cậy từ người tiêu dùng từ 56% (2023) lên 80%.

4. Khuyến nghị và kết luận

4.1. Khuyến nghị

Để đảm bảo quá trình chuyển đổi sang thanh toán không dùng tiền mặt (TTKDTM) diễn ra hiệu quả và bền vững tại Việt Nam, cần triển khai một chiến lược tổng thể đến năm 2030, trong đó tập trung vào ba nhóm giải pháp trọng tâm: Thứ nhất là chính sách hỗ trợ tài chính – pháp lý, thứ hai là nâng cao nhận thức và kỹ năng số, thứ ba là tăng cường đầu tư bảo mật – niềm tin người dùng và thứ tư là vai trò Ngân hàng nhà nước.

4.1.1. Chính sách hỗ trợ và đầu tư hạ tầng



Nguồn: Ngân hàng Nhà nước Việt Nam (2023), tác giả tổng hợp và dự báo

Chính phủ cần ban hành các chính sách ưu đãi và cam kết đầu tư dài hạn nhằm khuyến khích doanh nghiệp, đặc biệt là các công ty Fintech, mở rộng dịch vụ thanh toán đến vùng sâu vùng xa. Các biện pháp cần thiết bao gồm:

Ưu đãi thuế doanh nghiệp: Giảm 20%–30% thuế trong 5 năm đầu đối với Fintech triển khai dịch vụ ở khu vực chưa có hạ tầng số.

Hỗ trợ tài chính: Cung cấp các gói vay ưu đãi với lãi suất thấp hơn thị trường 30% cho các dự án xây dựng hệ thống thanh toán, POS, ATM và kết nối ngân hàng lõi.

Tăng ngân sách đầu tư công vào hạ tầng số: Dự kiến tăng trưởng ngân sách ít nhất 15% mỗi năm, từ 3.2 nghìn tỷ VND năm 2023 lên hơn 8.5 nghìn tỷ VND vào năm 2030.

Bảng 1: Dự kiến ngân sách phát triển hạ tầng thanh toán số (2023–2030)

Năm	Ngân sách đầu tư (tỷ VND)	Tăng trưởng (%)
2023	3.2	15
2024	3.68	15
2025	4.23	15
2026	4.87	15
2027	5.6	15

2028	6.44	15
2029	7.41	15
2030	8.52	15

Nguồn: Ngân hàng Nhà nước Việt Nam (2023), tác giả tổng hợp và dự báo

4.1.2. Nâng cao nhận thức cộng đồng và kỹ năng số

Thói quen sử dụng tiền mặt vẫn phổ biến trong dân cư nông thôn và người cao tuổi. Do đó, cần có chính sách giáo dục tài chính số toàn dân, thông qua các hoạt động sau:

Chiến dịch truyền thông thường xuyên: Tăng ngân sách ít nhất 25% mỗi năm, phối hợp giữa nhà nước – doanh nghiệp – tổ chức đoàn thể để tiếp cận các nhóm yếu thế công nghệ.

Đào tạo thực hành tại cộng đồng: Tổ chức các khóa học ngắn hạn ở xã/phường hướng dẫn người dân sử dụng ví điện tử, mã QR, chuyển khoản, bảo mật OTP.

Mục tiêu năm 2030: Nâng tỷ lệ người dân có kỹ năng sử dụng cơ bản dịch vụ thanh toán số từ 45% (2023) lên 80% vào năm 2030.

Bảng 2: Ngân sách truyền thông nâng cao nhận thức (2023–2030)

Năm	Ngân sách truyền thông (tỷ VND)	Tăng trưởng (%)
2023	800	25
2024	1,000	25
2025	1,250	25
2026	1,563	25
2027	1,953	25
2028	2,441	25
2029	3,051	25
2030	3,814	25

Nguồn: Tác giả tổng hợp và nội suy từ báo cáo của World Bank (2021)



Nguồn: Tác giả tổng hợp và nội suy từ báo cáo của World Bank (2021)

4.1.3. Đầu tư vào bảo mật và tăng cường lòng tin người dùng

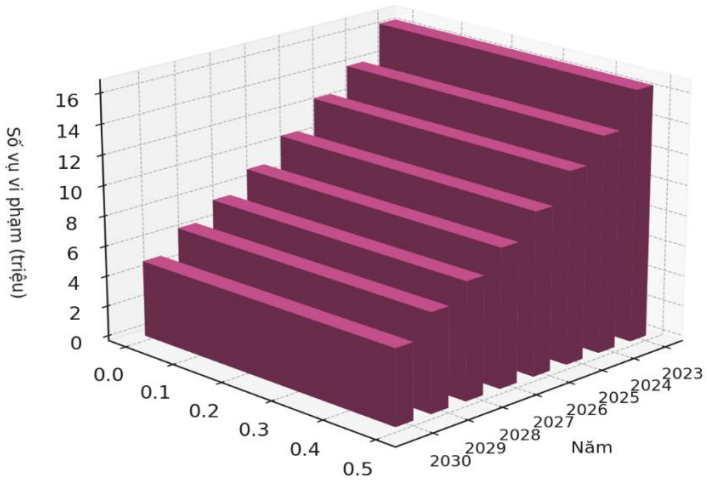
Bảng 3: Mục tiêu giảm vi phạm an ninh mạng (2023–2030)

Năm	Số vụ vi phạm an ninh mạng (triệu)	Giảm (%)
2023	16.5	8.3
2024	14.2	13.9
2025	12.6	11.3
2026	10.7	15.1
2027	9.1	14.9

2028	7.7	15.4
2029	6.5	15.6
2030	5	15.4

Nguồn: Kaspersky (2022), tác giả nội suy và phân tích đến 2030

Biểu đồ 3: Mục tiêu giảm vi phạm an ninh mạng (2023–2030)



Nguồn: Kaspersky (2022), tác giả nội suy và phân tích đến 2030

Rủi ro bảo mật là nguyên nhân khiến nhiều người e ngại chuyển sang thanh toán số. Vì vậy, cần tăng cường đầu tư và thiết lập chuẩn an toàn tài chính số toàn ngành:

Đầu tư bảo mật chủ động: Mỗi Fintech và ngân hàng cần dành tối thiểu 10% doanh thu cho các giải pháp như: mã hóa dữ liệu, AI phát hiện gian lận, xác thực đa yếu tố.

Thiết lập chuẩn an toàn toàn quốc: Phối hợp Bộ Thông tin và Truyền thông ban hành bộ tiêu chuẩn bảo mật cho thanh toán điện tử theo thông lệ quốc tế.

Mục tiêu đến 2030: Giảm số vụ tấn công mạng từ 18 triệu (2022) xuống còn <5 triệu vụ, nâng tỷ lệ người dân tin tưởng sử dụng thanh toán số từ 56% (2023) lên 80% (2030).

4.1.4. Vai trò Ngân hàng Nhà nước Việt Nam (NHNN)

Là cơ quan quản lý cao nhất trong lĩnh vực tiền tệ và thanh toán, Ngân hàng Nhà nước Việt Nam đóng vai trò then chốt trong việc thúc đẩy hệ sinh thái thanh toán không dùng tiền mặt. Để đảm bảo hiệu quả triển khai trên phạm vi toàn quốc và hướng đến mục tiêu xã hội không tiền mặt vào năm 2030, tác giả đề xuất một số kiến nghị cụ thể sau:

Một là, hoàn thiện hành lang pháp lý cho Fintech và thanh toán số: NHNN cần tiếp tục hoàn thiện các quy định liên quan đến hoạt động trung gian thanh toán, bảo mật dữ liệu người dùng, và quản lý ví điện tử. Cần có khung pháp lý thử nghiệm (sandbox) linh hoạt để hỗ trợ các mô hình công nghệ tài chính mới.

Hai là, tăng cường giám sát rủi ro và bảo mật hệ thống thanh toán: Cần xây dựng hệ thống cảnh báo sớm, chia sẻ dữ liệu gian lận giữa các ngân hàng, tổ chức trung gian thanh toán và cơ quan quản lý nhằm giảm thiểu các rủi ro an ninh mạng ngày càng tinh vi.

Ba là, đẩy mạnh phổ cập tài chính số: NHNN có thể phối hợp cùng Bộ Thông tin và Truyền thông, Bộ Giáo dục & Đào tạo, các tổ chức tài chính – xã hội để triển khai các chương trình giáo dục tài chính, nâng cao hiểu biết của người dân về quyền lợi, rủi ro và kỹ năng sử dụng thanh toán số.

Bốn là, hỗ trợ tài chính và kỹ thuật cho các ngân hàng thương mại nhỏ và các tổ chức tín dụng: Nhằm bảo đảm tính bao trùm, NHNN nên có cơ chế hỗ trợ các tổ chức quy mô nhỏ tiếp cận hạ tầng thanh toán số hiện đại thông qua chia sẻ nền tảng, trợ cấp công nghệ, hoặc giảm chi phí kết nối hệ thống.

Năm là, công khai chỉ số giám sát hiệu quả thanh toán số: NHNN nên công bố định kỳ các chỉ số như mức độ bao phủ thanh toán không dùng tiền mặt, tỷ lệ giao dịch số, chỉ số an toàn thanh toán, v.v. để tăng tính minh bạch và định hướng thị trường.

4.2. Kết luận

Thanh toán không dùng tiền mặt (TTKDTM) đang trở thành một trong những trụ cột quan trọng trong quá trình chuyển đổi số của nền kinh tế Việt Nam. Nghiên cứu này đã tổng hợp, phân tích và cập nhật bức tranh toàn diện về những cơ hội, thách thức cũng như giải pháp chính sách để thúc đẩy TTKDTM trong giai đoạn từ nay đến năm 2030.

Tính mới của bài nghiên cứu nằm ở việc tích hợp các dữ liệu cập nhật đến năm 2023, đồng thời dự báo định lượng ngân sách đầu tư, chi phí truyền thông và mục tiêu an toàn mạng đến năm 2030 – điều chưa được đề cập rõ ràng trong các nghiên cứu trước. Ngoài ra, nghiên cứu cũng đề xuất khung khuyến nghị cụ thể theo từng chủ thể (chính phủ, doanh nghiệp, người dân và Ngân hàng Nhà nước), giúp gia tăng tính ứng dụng thực tiễn.

Tuy nhiên, bài nghiên cứu vẫn tồn tại một số hạn chế. Thứ nhất, nghiên cứu chủ yếu sử dụng phương pháp tổng hợp tài liệu và phân tích định tính nên chưa phản ánh sâu sắc các yếu tố định lượng như hành vi người tiêu dùng hay hiệu quả chính sách. Thứ hai, phạm vi nghiên cứu tập trung vào dữ liệu từ các thành phố lớn như Hà Nội và TP.HCM, chưa đại diện đầy đủ cho khu vực nông thôn – nơi tiềm ẩn nhiều rào cản trong tiếp cận tài chính số. Cuối cùng, bài viết chưa có khảo sát thực địa hoặc phỏng vấn chuyên gia để củng cố thêm lập luận.

Dù vậy, nghiên cứu này vẫn đóng vai trò gợi mở và nền tảng cho các nghiên cứu tiếp theo. Các học giả có thể tiếp tục mở rộng theo hướng: (1) đo lường hiệu quả tác động kinh tế – xã hội của TTKDTM tại từng địa phương; (2) đánh giá tác động của AI, blockchain, và các công nghệ mới vào hệ thống thanh toán tại Việt Nam; (3) xây dựng mô hình thực nghiệm về hành vi chấp nhận TTKDTM trong từng phân khúc dân cư.

Với định hướng đúng đắn, sự phối hợp chặt chẽ giữa chính phủ, Ngân hàng Nhà nước và các tổ chức tài chính – công nghệ sẽ giúp Việt Nam rút ngắn khoảng cách chuyển đổi tài chính số so với các nước trong khu vực ASEAN và tiệm cận chuẩn quốc tế về một xã hội không tiền mặt.

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SỰ PHÁT TRIỂN CỦA KHOA HỌC CÔNG NGHỆ TÁC ĐỘNG ĐẾN TẠP CHÍ KHOA HỌC TRONG TÌNH HÌNH MỚI

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TÓM TẮT

Sự phát triển của khoa học và công nghệ, đặc biệt là cuộc cách mạng công nghiệp với công nghệ số, trí tuệ nhân tạo... đã và đang làm thay đổi sâu sắc đến nhiều lĩnh vực. Có thể thấy tác động của công nghệ số không chỉ trong lĩnh vực giáo dục mà nó còn tác động đến việc phổ biến kiến thức của các tạp chí trong thời đại khoa học công nghệ hiện nay ở Việt Nam. Bài viết này nghiên cứu phân tích về sự phát triển của khoa học công nghệ đã tạo ra những cơ hội mới với tạp chí khoa học trong thực tiễn hiện nay.

Từ khóa: công nghệ số, kiến thức, tạp chí khoa học.

1. ĐẶT VẤN ĐỀ

Ở Việt Nam, sự phát triển của khoa học, quá trình hội nhập đã và đang tác động đến mọi mặt đời sống từ kinh tế, chính trị, văn hóa, xã hội, khoa học, nghệ thuật, giáo dục... Đối với hoạt động của các tạp chí khoa học cũng chịu tác động không nhỏ bởi sự phát triển của khoa học công nghệ. Đa dạng hóa các hình thức phổ biến, thuận lợi hơn trong việc trao đổi thông tin... là những cơ hội cho hoạt động tạp chí ở Việt Nam. Khi khoa học và công nghệ phát triển, tạp chí cần sự thay đổi để có thể cạnh tranh nhiều hơn, các công trình công bố phải đáp ứng được yêu cầu điều kiện mới, phương pháp và hình thức hoạt động phải thay đổi.

Sự phát triển của công nghệ số đã làm thay đổi cách thức tiếp cận tri thức của con người, từ môi trường giáo dục đến cách các tạp chí khoa học phổ biến thông tin. Tại Việt Nam, xu hướng chuyển đổi số trong giáo dục và tạp chí khoa học đang giúp nâng cao chất lượng đào tạo, mở rộng cơ hội tiếp cận tri thức cho nhiều người, đồng thời thúc đẩy quá trình hội nhập quốc tế. Tuy nhiên, bên cạnh những lợi ích, các thách thức như bảo mật thông tin, kiểm soát chất lượng nội dung và bản quyền cũng cần được quan tâm để phát triển bền vững trong kỷ nguyên số. Bài viết này tìm hiểu về sự phát triển của công nghệ đã tạo ra những cơ hội với việc mở rộng phổ biến kiến thức của tạp chí khoa học trong thời đại hiện nay, đáp ứng kịp thời yêu cầu hội nhập quốc tế.

2. PHƯƠNG PHÁP NGHIÊN CỨU

– Phương pháp tổng quan tài liệu: Thu thập, phân tích các tài liệu khoa học, báo cáo nghiên cứu liên quan đến sự phát triển của khoa học công nghệ và lĩnh vực xuất bản khoa học. Đánh giá các xu hướng toàn cầu và trong nước về sự thay đổi của tạp chí khoa học dưới tác động của công nghệ.

– Phương pháp phân tích và tổng hợp lý thuyết: Hệ thống hóa các lý thuyết liên quan đến xuất bản khoa học, chuyển đổi số và tác động của công nghệ đối với truyền thông học thuật. Phân tích sự thay đổi trong quy trình biên tập, xuất bản, phổ biến và đánh giá tạp chí khoa học.

– Phương pháp thống kê và phân tích dữ liệu: Thu thập dữ liệu về tạp chí điện tử, hệ thống trích dẫn và các chỉ số ảnh hưởng của tạp chí. Phân tích xu hướng sử dụng công nghệ trong xuất bản khoa học.

Thông qua các phương pháp trên, bài báo sẽ cung cấp cái nhìn toàn diện về tác động của khoa học công nghệ đến tạp chí khoa học, từ đó đề xuất giải pháp nâng cao chất lượng và hiệu quả xuất bản trong tình hình mới.

3. KẾT QUẢ VÀ THẢO LUẬN

Sự phát triển của khoa học công nghệ, đặc biệt là sự bùng nổ của công nghệ số và trí tuệ nhân tạo, đã mang lại những thay đổi căn bản cho các tạp chí khoa học. Trước đây, tạp chí khoa học chủ yếu là những ấn phẩm in ấn phát hành định kỳ, với quy mô phát hành chủ yếu giới hạn trong phạm vi một quốc gia hoặc khu vực nhất định. Tuy nhiên, trong thời đại số hiện nay, các tạp chí khoa học đã chuyển mình mạnh mẽ sang hình thức trực tuyến, mở ra nhiều cơ hội lớn trong việc phổ biến và tiếp cận kiến thức khoa học toàn cầu. Các tạp chí khoa học không chỉ đơn thuần là nơi công bố các nghiên

cứu khoa học mà còn trở thành nền tảng quan trọng trong việc kết nối, chia sẻ kiến thức và trao đổi ý tưởng nghiên cứu giữa các nhà khoa học, học giả và cộng đồng quốc tế.

Công nghệ số đã mang lại nhiều lợi ích rõ rệt cho các tạp chí khoa học, từ việc gia tăng khả năng tiếp cận, mở rộng đối tượng độc giả đến việc tối ưu hóa quy trình xuất bản và đánh giá bài báo. Trí tuệ nhân tạo (AI) có thể hỗ trợ trong việc tự động hóa các quy trình như quét và phân tích dữ liệu, nhận diện các xu hướng nghiên cứu, thậm chí là đánh giá chất lượng bài báo trước khi công bố. Một ví dụ điển hình là việc sử dụng công nghệ số trong việc nhận diện các bài báo có dấu hiệu đạo văn, đảm bảo tính minh bạch và đạo đức trong nghiên cứu khoa học. Tuy nhiên, sự phát triển mạnh mẽ của công nghệ số cũng đặt ra những thách thức không nhỏ đối với các tạp chí khoa học. Vấn đề về bản quyền, thông tin giả mạo và sự mất kiểm soát thông tin là những vấn đề cần phải được giải quyết khi công nghệ số ngày càng phát triển mạnh mẽ. Bên cạnh đó, việc duy trì chất lượng và uy tín của các tạp chí khoa học trong môi trường số hóa là một vấn đề cần phải được nghiên cứu và tìm kiếm giải pháp phù hợp. Ở Việt Nam, sự phát triển của các tạp chí khoa học đã và đang bước vào giai đoạn hội nhập mạnh mẽ với cộng đồng quốc tế. Với sự hỗ trợ của công nghệ số, các tạp chí khoa học Việt Nam có thể tiếp cận các nền tảng quốc tế, đăng tải bài báo nghiên cứu lên các cơ sở dữ liệu lớn như Google Scholar, Scopus hay Web of Science, từ đó giúp tăng cường sự hiện diện và tác động của các nghiên cứu khoa học Việt Nam trong cộng đồng khoa học quốc tế. Tuy nhiên, để nâng cao chất lượng và uy tín của các tạp chí khoa học Việt Nam, một yếu tố quan trọng là sự đổi mới trong công tác quản lý và phát triển nội dung. Các tạp chí khoa học Việt Nam cần không ngừng cải tiến quy trình xuất bản, phát triển đội ngũ biên tập viên và các chuyên gia đánh giá bài báo, đồng thời áp dụng các công nghệ tiên tiến để nâng cao hiệu quả công tác xuất bản. Bên cạnh các tạp chí khoa học truyền thống, mạng xã hội và các cộng đồng trực tuyến cũng ngày càng trở thành một phương tiện quan trọng trong việc phát tán nghiên cứu khoa học. Các nền tảng như ResearchGate, Academia.edu, hay thậm chí Twitter và Facebook hiện nay đang trở thành những công cụ không thể thiếu để các nhà khoa học chia sẻ kết quả nghiên cứu, kết nối với đồng nghiệp và đối tác, và nhận được phản hồi từ cộng đồng. Các nền tảng này không chỉ giúp tăng tốc độ truyền tải thông tin mà còn giúp các tạp chí khoa học xây dựng cộng đồng độc giả rộng lớn và năng động hơn. Tuy nhiên, sự kết hợp giữa các nền tảng truyền thống và mạng xã hội cũng đặt ra yêu cầu về việc quản lý và kiểm soát chất lượng thông tin. Việc đảm bảo rằng các bài báo khoa học được phát tán đúng cách và đúng chất lượng thông qua các kênh này là một thách thức lớn đối với các nhà xuất bản và các tạp chí khoa học. Sự phát triển của khoa học công nghệ, đặc biệt là công nghệ số và trí tuệ nhân tạo, đang mở ra những cơ hội mới cho các tạp chí khoa học. Việc ứng dụng các công nghệ tiên tiến trong quy trình xuất bản, quản lý bài báo và phát tán nghiên cứu khoa học sẽ không chỉ giúp các tạp chí nâng cao chất lượng mà còn tạo ra một môi trường giao thoa học thuật quốc tế rộng mở hơn. Tuy nhiên, cũng cần nhận thức rõ về những thách thức mà công nghệ số mang lại, từ việc đảm bảo chất lượng bài báo đến vấn đề bản quyền và thông tin giả mạo. Để duy trì sự phát triển bền vững, các tạp chí khoa học cần chủ động đổi mới và áp dụng những công nghệ mới nhất trong công tác xuất bản và quản lý.

Với sự phát triển mạnh mẽ của khoa học công nghệ, đặc biệt là sự chuyển đổi sang kỷ nguyên số, nhu cầu tiếp nhận thông tin và phương thức tiếp nhận thông tin của con người đã có sự thay đổi sâu sắc. Những thay đổi này không chỉ tác động đến cách thức chúng ta tiếp cận thông tin mà còn đặt ra yêu cầu mới đối với các tạp chí khoa học. Để đáp ứng được nhu cầu ngày càng cao của độc giả và cộng đồng nghiên cứu, các tạp chí khoa học cần phải có sự thay đổi căn bản, từ phương thức truyền tải đến hình thức xuất bản, sao cho phù hợp với tình hình mới và đảm bảo tạo ra giá trị thực tiễn trong bối cảnh phát triển toàn cầu hiện nay. Sự phát triển mạnh mẽ của khoa học và công nghệ, đặc biệt là sự chuyển đổi sang kỷ nguyên số, đã làm thay đổi đáng kể nhu cầu tiếp nhận thông tin cũng như cách con người tiếp cận tri thức. Những biến đổi này không chỉ tác động đến phương thức chúng ta tiếp nhận thông tin mà còn đặt ra yêu cầu cấp thiết đối với các tạp chí khoa học. Để thích nghi với sự thay đổi nhanh chóng của thời đại và đáp ứng nhu cầu ngày càng cao của độc giả cũng như cộng đồng nghiên cứu, các tạp chí khoa học cần phải có những đổi mới căn bản trong phương thức truyền tải và hình thức xuất bản. Việc này không chỉ giúp nâng cao hiệu quả tiếp cận tri thức mà còn đảm bảo giá trị thực tiễn của các công trình khoa học trong bối cảnh toàn cầu hóa.

Trong kỷ nguyên số, việc tiếp nhận thông tin không còn giới hạn trong sách báo truyền thống mà đã mở rộng sang nhiều nền tảng trực tuyến. Một số thay đổi quan trọng có thể kể đến như: Thứ nhất là việc chuyển từ hình thức đọc truyền thống sang đọc trực tuyến, với sự phát triển của Internet và thiết bị thông minh, độc giả có xu hướng tìm kiếm thông tin trên các nền tảng số như website, mạng xã hội, và thư viện điện tử thay vì chỉ dựa vào sách báo in. Thứ hai là sự tăng cường sử dụng công nghệ AI trong tiếp cận thông tin, các công cụ tìm kiếm thông minh và thuật toán đề xuất nội dung

giúp người dùng tìm được các bài báo, nghiên cứu phù hợp với nhu cầu của mình một cách nhanh chóng hơn. Thứ ba là đòi hỏi sự tương tác cao hơn, thay vì tiếp nhận thông tin một chiều, độc giả ngày nay mong muốn có sự tương tác trực tiếp với tác giả hoặc cộng đồng nghiên cứu để trao đổi, thảo luận và phản biện. Những thay đổi này đặt ra yêu cầu mới đối với các tạp chí khoa học trong việc đổi mới cách thức xuất bản và truyền tải thông tin. Trước đây, việc tiếp cận thông tin khoa học chủ yếu thông qua các ấn phẩm in, các hội nghị khoa học hoặc thư viện. Tuy nhiên, sự phát triển của công nghệ thông tin, đặc biệt là Internet và các nền tảng trực tuyến, đã làm thay đổi cách thức này. Các nhà nghiên cứu, giảng viên và sinh viên hiện nay có thể dễ dàng truy cập và tìm kiếm thông tin từ bất kỳ đâu, vào bất kỳ lúc nào thông qua các thiết bị điện tử. Điều này tạo ra một thách thức lớn đối với các tạp chí khoa học truyền thống trong việc giữ vững vị trí và thu hút độc giả. Tuy nhiên, đây cũng là một cơ hội lớn để các tạp chí khoa học chuyển mình, thích ứng với sự phát triển của công nghệ và nâng cao khả năng tiếp cận của mình. Tạp chí khoa học không còn chỉ là nơi công bố các bài báo nghiên cứu mà còn cần trở thành một công cụ kết nối, tạo ra diễn đàn mở để trao đổi và phát triển ý tưởng khoa học. Điều này đòi hỏi tạp chí phải phát huy tối đa các công cụ truyền thông hiện đại như xuất bản trực tuyến, ứng dụng công nghệ số trong việc biên tập và phản biện bài báo, cũng như cải tiến các quy trình quản lý để nâng cao hiệu quả công tác xuất bản. Để phù hợp với sự thay đổi của nhu cầu và thói quen tiếp nhận thông tin, các tạp chí khoa học cần phải chuyển mình cả về hình thức và phương thức truyền thông. Việc chuyển từ tạp chí in sang tạp chí trực tuyến là một bước đi quan trọng, giúp tạp chí có thể tiếp cận độc giả rộng rãi hơn, đồng thời tiết kiệm chi phí in ấn và phát hành. Tạp chí khoa học trực tuyến không chỉ giúp việc công bố kết quả nghiên cứu nhanh chóng mà còn giúp các nhà nghiên cứu nhận được phản hồi ngay lập tức từ cộng đồng khoa học, tạo ra một môi trường học thuật cởi mở và linh hoạt. Ngoài ra, các tạp chí khoa học cũng cần phải làm mới nội dung và cách thức trình bày để thu hút sự quan tâm của độc giả. Việc sử dụng các hình thức truyền thông đa phương tiện sẽ giúp làm phong phú thêm nội dung của tạp chí và dễ dàng tiếp cận đến một lượng độc giả lớn hơn, bao gồm cả những người không chuyên về khoa học nhưng có sự quan tâm đến các vấn đề khoa học và công nghệ. Một yếu tố quan trọng khác mà các tạp chí khoa học cần chú trọng là gắn kết với tình hình thực tế của địa bàn hoạt động, cũng như nhu cầu thực tế của cộng đồng khoa học tại các khu vực, quốc gia. Mỗi tạp chí khoa học không chỉ đơn thuần là một phương tiện để công bố kết quả nghiên cứu mà còn phải là một công cụ phục vụ trực tiếp cho các nhu cầu phát triển khoa học và công nghệ tại địa phương. Các tạp chí cần hiểu rõ nhu cầu nghiên cứu, thách thức trong phát triển và các vấn đề cụ thể của cộng đồng khoa học trong từng khu vực để có thể định hướng phát triển và nội dung phù hợp. Tạp chí khoa học cần chú trọng xây dựng nội dung gắn với những vấn đề thực tế của ngành, khu vực hoặc quốc gia, đồng thời phát huy vai trò trong việc hỗ trợ giải quyết các vấn đề cấp bách. Điều này giúp các tạp chí không chỉ là diễn đàn học thuật mà còn là nơi thể hiện mối liên kết giữa khoa học và thực tiễn xã hội, tạo ra sự gắn kết chặt chẽ hơn giữa nghiên cứu khoa học và ứng dụng thực tế.

Để xây dựng và phát triển tạp chí khoa học, ngoài việc đáp ứng các tiêu chí cơ bản của một tạp chí khoa học chuyên ngành, các tạp chí cũng cần phải dựa vào các yếu tố như nguồn lực tài chính, nhân sự, và cơ sở hạ tầng hiện có. Việc xác định rõ nguồn lực sẵn có và các điều kiện hoạt động sẽ giúp các tạp chí xây dựng chiến lược phát triển dài hạn, đảm bảo tính bền vững và hiệu quả. Tạp chí cần phải có những kế hoạch rõ ràng trong việc huy động nguồn lực, bao gồm tài chính, nhân lực và hợp tác quốc tế, để thực hiện nhiệm vụ của mình. Cùng với đó, các tạp chí khoa học cần phải tập trung phát triển đội ngũ biên tập viên chuyên nghiệp, có trình độ chuyên môn vững vàng và khả năng sáng tạo trong việc xây dựng nội dung. Đội ngũ này không chỉ cần am hiểu sâu sắc về lĩnh vực khoa học mà còn phải có khả năng quản lý xuất bản và ứng dụng công nghệ thông tin để đảm bảo quy trình xuất bản được vận hành trơn tru, hiệu quả. Trong bối cảnh hội nhập quốc tế ngày càng mạnh mẽ, các tạp chí khoa học cần có chiến lược để nâng cao chất lượng và uy tín, đáp ứng các tiêu chuẩn quốc tế. Tạp chí không chỉ cần nâng cao chất lượng bài viết mà còn phải chú trọng đến việc phát triển các chỉ số ảnh hưởng, tăng cường sự hiện diện trên các cơ sở dữ liệu quốc tế, và mở rộng hợp tác với các tổ chức khoa học toàn cầu. Để làm được điều này, các tạp chí khoa học phải không ngừng cải tiến chất lượng nội dung, quy trình biên tập và phản biện khoa học, nhằm đảm bảo tính khách quan và độ tin cậy cao trong mọi bài viết được công bố. Tạp chí khoa học cần tích cực tham gia vào mạng lưới xuất bản khoa học quốc tế, góp phần nâng cao giá trị của nghiên cứu khoa học Việt Nam trên trường quốc tế. Điều này không chỉ giúp nâng cao uy tín của các tạp chí mà còn thúc đẩy sự phát triển khoa học và công nghệ của Việt Nam trong bối cảnh hội nhập quốc tế hiện nay. Để đáp ứng yêu cầu trong bối cảnh phát triển của khoa học và công nghệ, các tạp chí khoa học cần phải thay đổi căn bản cả về hình thức và phương thức truyền thông. Điều này không chỉ giúp tạp chí duy trì vai trò quan trọng trong việc phổ biến tri thức khoa học mà còn tạo ra giá trị thực tiễn trong

việc phục vụ nhu cầu nghiên cứu và ứng dụng khoa học trong xã hội hiện đại. Sự phát triển mạnh mẽ của công nghệ thông tin và truyền thông sẽ là yếu tố thúc đẩy các tạp chí khoa học phát triển bền vững, góp phần không nhỏ vào sự phát triển chung của nền khoa học thế giới.

Nguyễn Lan Phương trong bài viết Những cơ hội và thách thức trong chuyển đổi số báo chí ở Việt Nam hiện nay, cho rằng chuyển đổi số (CĐS) báo chí ở nước ta cũng đang diễn ra với nhiều thách thức, làm hạn chế về mức độ sẵn sàng CĐS: "Hiện nay, nhu cầu thông tin và sự phát triển mạnh mẽ của khoa học, công nghệ tạo nên những cơ hội mới về CĐS báo chí, thúc đẩy phát triển các mô hình kinh tế báo chí mới... Tuy nhiên, CĐS báo chí ở nước ta cũng đang diễn ra với nhiều thách thức, làm hạn chế về mức độ sẵn sàng CĐS". [4]. Để tham gia vào việc phổ biến kiến thức khoa học, tạp chí cũng cần ưu tiên đầu tư các nguồn lực tài chính và con người, có cơ chế, chính sách thu hút các nhà khoa học quốc tế tham gia hội đồng biên tập; thực hiện đổi mới cả hình thức, nội dung, quy trình biên tập các bài đăng trong tạp chí phù hợp với các chuẩn mực, thông lệ của các tạp chí quốc tế: "Cùng với quá trình đào tạo dài hạn, cần tổ chức các hình thức ngắn hạn, như tập huấn, bồi dưỡng cho cán bộ quản lý thông tin, truyền thông và lãnh đạo các cơ quan báo chí về các kỹ năng cơ bản, cần thiết trong quá trình CĐS báo chí; kết hợp với các khóa đào tạo, nâng cao kiến thức, kỹ năng về công nghệ thông tin, an ninh mạng, thu thập, phân tích và xử lý dữ liệu, nhằm hỗ trợ quá trình đổi mới sản xuất, phân phối nội dung, cũng như giám sát và đánh giá chất lượng thông tin. Mở rộng quan hệ, hợp tác quốc tế, nâng cao năng lực từ kinh nghiệm của các quốc gia có nền báo chí số tiên tiến, nhằm theo kịp những xu hướng và thành tựu mới trong CĐS báo chí." [4]. Đứng trước những yêu cầu mới đặt ra, các tạp chí khoa học trong nước đã và đang có chiến lược riêng để phát triển trong bối cảnh hội nhập sâu rộng với hoạt động nghiên cứu khoa học trong khu vực và trên thế giới, tham gia vào việc phổ biến kiến thức khoa học rộng rãi.

Sự phát triển không ngừng của khoa học và công nghệ, đặc biệt là công nghệ thông tin, đã tạo ra những thay đổi sâu rộng trong nhiều lĩnh vực, trong đó có công tác xuất bản và phổ biến tri thức khoa học. Hệ thống cơ sở hạ tầng thông tin ngày càng phát triển mạnh mẽ, cho phép các nhà khoa học và nhà nghiên cứu dễ dàng tiếp cận nguồn tài liệu vô tận với thông tin không giới hạn về thời gian và không gian. Điều này đã mở ra một kỷ nguyên mới trong việc trao đổi và phổ biến thông tin khoa học, tạo ra một mạng lưới kết nối toàn cầu mà trước đây chưa từng có. Trước đây, để tiếp cận thông tin khoa học, các nhà nghiên cứu và giảng viên phải trực tiếp đến thư viện hoặc giảng đường, nơi mà các tài liệu và cơ sở vật chất thường bị hạn chế về mặt không gian và thời gian. Tuy nhiên, với sự phát triển mạnh mẽ của công nghệ thông tin, các nguồn tài liệu khoa học hiện nay có thể dễ dàng truy cập thông qua các nền tảng trực tuyến. Điều này không chỉ giúp mở rộng phạm vi tiếp cận mà còn giúp tăng tốc độ trao đổi thông tin giữa các nhà khoa học, giảng viên và sinh viên.

Việc sử dụng tạp chí khoa học trực tuyến là một ví dụ điển hình. Những tạp chí này không chỉ giúp giảng viên và sinh viên có môi trường học thuật đa dạng mà còn khuyến khích sự tham gia của cộng đồng khoa học toàn cầu. Các tạp chí trực tuyến không còn bị giới hạn bởi không gian vật lý, giúp cho việc trao đổi kiến thức, thảo luận học thuật diễn ra liên tục, nhanh chóng và thuận tiện hơn bao giờ hết. Công nghệ và khoa học phát triển mạnh mẽ đã mở ra những cơ hội để đa dạng hóa các hình thức phổ biến và trao đổi thông tin khoa học. Nếu trước đây giảng viên và sinh viên phải đến trường để học tập và nghiên cứu, thì ngày nay các loại hình học tập và giảng dạy linh hoạt như học trực tuyến, học từ xa, và sử dụng tài liệu trực tuyến đã trở thành những phương pháp phổ biến. Điều này giúp tiết kiệm thời gian, chi phí, và nâng cao hiệu quả học tập, đặc biệt là trong bối cảnh dịch bệnh hoặc những điều kiện đặc biệt không thể hoạt động trực tiếp. Sự phát triển của các tạp chí khoa học trực tuyến đã tạo ra một diễn đàn mở rộng cho việc trao đổi học thuật. Các nhà khoa học có thể công bố kết quả nghiên cứu của mình, tham gia phản biện khoa học, hoặc học hỏi từ các nghiên cứu khác một cách dễ dàng. Việc này không chỉ thúc đẩy sự phát triển của khoa học mà còn tạo ra môi trường học thuật đa chiều, nơi các quan điểm và giải pháp khoa học được thể hiện và chia sẻ một cách công khai và dân chủ. Sự phát triển của khoa học công nghệ không chỉ tạo ra cơ hội mới cho các nhà khoa học, mà còn mở ra cơ hội để các tạp chí khoa học của Việt Nam hội nhập mạnh mẽ với cộng đồng khoa học quốc tế. Các tạp chí khoa học Việt Nam hiện nay đã có thể kết nối với các nền tảng quốc tế, công bố các bài báo nghiên cứu lên các cơ sở dữ liệu quốc tế như Google Scholar, Scopus, và Web of Science. Điều này không chỉ giúp nâng cao chất lượng nghiên cứu khoa học trong nước mà còn giúp các nghiên cứu từ Việt Nam được biết đến rộng rãi hơn, tạo dựng uy tín quốc tế. Tuy nhiên, để các tạp chí khoa học Việt Nam có thể cạnh tranh và phát triển bền vững trong môi trường toàn cầu hóa, việc nâng cao chất lượng nội dung và quy trình xuất bản là rất quan trọng. Các tạp chí cần chủ động áp dụng các công nghệ hiện đại trong việc xuất bản, phản biện, và quảng bá nghiên cứu khoa học để có thể đạt chuẩn quốc tế, đồng thời đáp ứng yêu cầu ngày càng cao của các nhà khoa

học, học giả và độc giả.

Sự phát triển mạnh mẽ của khoa học công nghệ đã tạo ra nhiều cơ hội, nhưng cũng không thiếu thách thức đối với các tạp chí khoa học. Một trong những thách thức lớn nhất là vấn đề chất lượng và độ tin cậy của thông tin. Khi mà các thông tin khoa học có thể dễ dàng tiếp cận và chia sẻ, việc kiểm soát chất lượng bài báo, ngăn ngừa thông tin sai lệch hoặc đạo văn là một vấn đề cần được giải quyết nghiêm túc. Các tạp chí khoa học cần xây dựng các quy trình kiểm soát chất lượng nghiêm ngặt, từ việc tiếp nhận bài báo, phản biện, đến xuất bản và quảng bá nghiên cứu. Bên cạnh đó, việc chuyển đổi số và ứng dụng công nghệ thông tin vào công tác xuất bản cũng là một yếu tố quan trọng giúp các tạp chí phát triển bền vững. Các tạp chí không chỉ cần cải thiện quy trình xuất bản trực tuyến mà còn phải đổi mới phương thức quản trị số để nâng cao chất lượng công tác tổ chức và vận hành. Điều này đòi hỏi các tạp chí phải đầu tư vào hạ tầng công nghệ, nâng cao năng lực đội ngũ biên tập viên, và cập nhật các xu hướng công nghệ mới. Để đáp ứng yêu cầu hội nhập quốc tế, các tạp chí khoa học cần phải nâng cao chất lượng, xây dựng bản sắc riêng, và tiệm cận với chuẩn mực quốc tế. Điều này đòi hỏi các tạp chí phải chú trọng đến việc xuất bản các bài báo bằng tiếng Anh, mở rộng hội đồng biên tập với các chuyên gia quốc tế, và tuân thủ các thông lệ xuất bản quốc tế. Bên cạnh đó, việc duy trì và phát triển các chuyên mục phù hợp, cập nhật các xu hướng nghiên cứu mới, và cung cấp thông tin khoa học chính xác, kịp thời sẽ giúp các tạp chí khoa học không chỉ giữ vững uy tín mà còn nâng cao giá trị khoa học trong cộng đồng nghiên cứu quốc tế. Sự phát triển của khoa học công nghệ hiện nay yêu cầu các tạp chí khoa học phải nhanh chóng thích ứng với các xu hướng mới, đặc biệt là chuyển đổi số để phục vụ nhu cầu ngày càng cao của độc giả. Tạp chí khoa học cần chủ động đổi mới và phát triển theo các chuẩn mực quốc tế, đồng thời đảm bảo tính minh bạch và chất lượng cao trong công tác xuất bản. Đầu tư vào công nghệ thông tin, nâng cao chất lượng đội ngũ biên tập viên, và cải thiện quy trình xuất bản sẽ giúp các tạp chí không chỉ nâng cao chất lượng nội dung mà còn tạo ra cơ hội phát triển mạnh mẽ trong bối cảnh hội nhập quốc tế. Việc phát triển tạp chí khoa học trong thời đại công nghệ số không chỉ là yêu cầu cấp bách mà còn là một cơ hội lớn để thúc đẩy sự phát triển khoa học, tăng cường sự kết nối giữa các nhà khoa học và cộng đồng quốc tế, từ đó đóng góp vào sự phát triển chung của xã hội.

Trong bối cảnh toàn cầu hóa và sự phát triển mạnh mẽ của khoa học – công nghệ, việc xây dựng và phát triển một tạp chí khoa học không chỉ dừng lại ở việc đáp ứng các tiêu chí cơ bản của một tạp chí chuyên ngành, mà còn phải chú trọng đến các yếu tố như nguồn lực tài chính, nhân sự và cơ sở hạ tầng. Một chiến lược phát triển rõ ràng sẽ giúp tạp chí khoa học đảm bảo tính bền vững, nâng cao chất lượng xuất bản, đồng thời mở rộng phạm vi ảnh hưởng trong giới nghiên cứu và học thuật. Trước khi xây dựng chiến lược phát triển, một tạp chí khoa học cần đánh giá nguồn lực hiện có và các điều kiện hoạt động để có hướng đi phù hợp. Các yếu tố quan trọng cần được xem xét bao gồm: Đảm bảo nguồn kinh phí ổn định để duy trì hoạt động, từ chi phí xuất bản, hệ thống quản lý đến việc trả lương cho đội ngũ biên tập. Đội ngũ biên tập viên, chuyên gia thẩm định bài báo, nhân viên kỹ thuật và quản lý đóng vai trò then chốt trong việc đảm bảo chất lượng xuất bản. Hệ thống xuất bản trực tuyến, cơ sở dữ liệu khoa học, phần mềm quản lý bài viết, nền tảng đánh giá phản biện… giúp nâng cao hiệu quả hoạt động. Việc xác định rõ các nguồn lực này giúp tạp chí xây dựng chiến lược phát triển dài hạn, đảm bảo tính bền vững và mở rộng khả năng hội nhập quốc tế. Tạp chí khoa học có thể tìm kiếm và huy động nguồn tài chính từ nhiều kênh khác nhau để đảm bảo hoạt động ổn định. Nguồn tài trợ từ các tổ chức khoa học: Các viện nghiên cứu, trường đại học, tổ chức khoa học trong và ngoài nước thường có các quỹ hỗ trợ phát triển tạp chí học thuật; Hợp tác với doanh nghiệp: Các doanh nghiệp công nghệ, y dược, kỹ thuật… có thể tài trợ tạp chí để quảng bá nghiên cứu hoặc hỗ trợ công bố các công trình liên quan đến lĩnh vực của họ. Mô hình xuất bản thu phí: Một số tạp chí có thể áp dụng mô hình thu phí tác giả hoặc độc giả để duy trì tài chính. Tuy nhiên, cần cân nhắc giữa tính thương mại và tính học thuật để đảm bảo uy tín của tạp chí. Hợp tác với các nhà xuất bản quốc tế, tham gia các nền tảng xuất bản lớn như có thể giúp tạp chí tăng cơ hội nhận tài trợ và mở rộng mạng lưới phân phối.

Để duy trì và nâng cao chất lượng nội dung, tạp chí cần có một đội ngũ biên tập viên và chuyên gia phản biện có trình độ chuyên môn cao. Một số yếu tố quan trọng cần chú trọng: Đào tạo và bồi dưỡng nghiệp vụ: Các biên tập viên cần được đào tạo về quy trình xuất bản khoa học, đạo đức nghiên cứu, phương pháp thẩm định bài báo. Mở rộng mạng lưới cộng tác viên: Tạp chí cần hợp tác với các nhà khoa học, chuyên gia trong nhiều lĩnh vực để đảm bảo chất lượng phản biện và nội dung phong phú. Ứng dụng công nghệ trong quản lý xuất bản: Biên tập viên cần có kỹ năng sử dụng các phần mềm hỗ trợ xuất bản như hệ thống quản lý bài báo, kiểm duyệt nội dung tự động, phát hiện đạo văn. Hợp tác quốc tế không chỉ giúp nâng cao uy tín của tạp chí mà còn mở rộng cơ hội tiếp cận các nguồn lực và công nghệ xuất bản tiên

tiến, liên kết với các tạp chí uy tín. Tham gia vào mạng lưới các tạp chí khoa học quốc tế giúp nâng cao khả năng trao đổi bài viết và phản biện chéo. Tham gia các hệ thống chỉ mục quốc tế, để tăng độ nhận diện và giá trị học thuật, tạp chí cần được đưa vào các cơ sở dữ liệu uy tín như Scopus, Web of Science, Google Scholar. Hợp tác với nhà nghiên cứu nước ngoài, mời các nhà khoa học quốc tế tham gia vào ban biên tập hoặc phản biện giúp nâng cao chất lượng tạp chí và mở rộng phạm vi tiếp cận độc giả toàn cầu. Trong thời đại công nghệ số, việc số hóa quy trình xuất bản là yếu tố then chốt giúp tạp chí nâng cao hiệu suất làm việc và giảm thời gian xử lý bài báo, giúp tiết kiệm thời gian cho đội ngũ biên tập. Ngoài bài báo truyền thống, tạp chí có thể mở rộng các hình thức nội dung khác để tiếp cận độc giả hiệu quả hơn. Việc xây dựng và phát triển tạp chí khoa học không chỉ dừng lại ở việc đáp ứng các tiêu chí chuyên môn mà còn đòi hỏi chiến lược huy động nguồn lực, đầu tư nhân sự chất lượng cao và ứng dụng công nghệ tiên tiến. Một tạp chí khoa học muốn tồn tại và phát triển bền vững cần có tầm nhìn dài hạn, đổi mới trong phương thức xuất bản và không ngừng mở rộng hợp tác quốc tế. Nếu tận dụng tốt các nguồn lực sẵn có và áp dụng chiến lược phù hợp, các tạp chí khoa học có thể khẳng định vị thế của mình trên bản đồ học thuật quốc tế, góp phần nâng cao chất lượng nghiên cứu khoa học trong nước và thúc đẩy sự phát triển của nền khoa học toàn cầu.

4. KẾT LUẬN

Để phát triển và nâng cao hiệu quả hoạt động cho các loại hình tạp chí khoa học ở Việt Nam hiện nay thì các tạp chí hiện nay cũng cần quan tâm đến công tác xây dựng, hoàn thiện website, phần mềm quản lý, quảng bá truyền thông, hỗ trợ tối đa để các tạp chí khoa học trong nước có thể nhanh chóng gia nhập các hệ thống quốc tế. Trong xu thế hội nhập quốc tế, tham gia vào việc phổ biến kiến thức khoa học rộng rãi, các tạp chí khoa học trong nước rất cần nguồn nhân lực chất lượng. Việc này đặt ra cho các tạp chí khoa học ở Việt Nam những cơ hội và thách thức mới, việc tận dụng được những cơ hội do những tiến bộ khoa học công nghệ mang lại để đổi mới nội dung, chương trình, cách thức quản lý các tạp chí khoa học, có thứ hạng trong bảng xếp hạng theo chuẩn chung quốc tế. Những thách thức không nhỏ đối với các tạp chí khoa học phải vượt qua sẽ là điều rất quan trọng để hoạt động công bố, phổ biến kiến thức khoa học phát triển và có được nhiều thành công hơn nữa.

Sự phát triển mạnh mẽ của khoa học công nghệ đã và đang tác động sâu sắc đến các tạp chí khoa học trong bối cảnh mới. Công nghệ số hóa, trí tuệ nhân tạo, dữ liệu lớn và các nền tảng xuất bản trực tuyến không chỉ thay đổi cách thức xuất bản, quản lý và phân phối tri thức khoa học mà còn đặt ra những thách thức mới về chất lượng, đạo đức và khả năng tiếp cận tri thức. Trước xu thế này, các tạp chí khoa học cần chủ động đổi mới mô hình hoạt động, áp dụng công nghệ hiện đại để nâng cao hiệu quả xuất bản, đảm bảo tính minh bạch và uy tín của nghiên cứu. Đồng thời, cần có sự phối hợp chặt chẽ giữa các nhà khoa học, nhà xuất bản và các tổ chức liên quan nhằm xây dựng hệ sinh thái khoa học số hóa bền vững, phục vụ tốt hơn cho cộng đồng nghiên cứu và xã hội. Nhìn chung, sự phát triển của khoa học công nghệ không chỉ đặt ra thách thức mà còn mở ra nhiều cơ hội để các tạp chí khoa học thích nghi, phát triển và đóng vai trò quan trọng trong việc truyền bá tri thức, thúc đẩy tiến bộ khoa học trên phạm vi rộng lớn hơn.

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BƯỚC NHẢY SỐ CỦA SINH VIÊN ĐẠI HỌC: THÁCH THỨC HAY CƠ HỘI VÀNG

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TÓM TẮT

Chuyển đổi số đang trở thành xu thế trong nhiều lĩnh vực, và giáo dục cũng không nằm ngoài cuộc cách mạng này. Quyết định số 131/QĐ-TTg của Thủ tướng Chính phủ đã đề ra mục tiêu tăng cường ứng dụng công nghệ số trong giáo dục, giúp sinh viên có môi trường học tập hiện đại và kỹ năng cần thiết để hội nhập nền kinh tế số. Chuyển đổi số mang lại cả thách thức lẫn cơ hội cho sinh viên. Bài báo tập trung phân tích những khó khăn sinh viên gặp phải trong bối cảnh chuyển đổi số, đồng thời nhấn mạnh các cơ hội nổi bật mà sinh viên có thể tận dụng để xây dựng tương lai nghề nghiệp, đặc biệt là trong một thị trường lao động số hóa đầy tiềm năng trong cuộc cách mạng công nghệ 4.0.

Từ khóa: Cơ hội chuyển đổi số, học tập số, sinh viên thế hệ số, số hóa giáo dục đại học, thách thức chuyển đổi số.

1. ĐẶT VẤN ĐỀ

Chuyển đổi số đã trở thành một xu thế trong các lĩnh vực như kinh tế, tài chính, y tế, và nhiều ngành khác. Giáo dục với vai trò cốt lõi trong việc hình thành nguồn nhân lực chất lượng cao cũng không đứng ngoài cuộc cách mạng số này. Quyết định số 131/QĐ-TTg của Thủ tướng Chính phủ ban hành năm 2022, phê duyệt Đề án "Tăng cường ứng dụng công nghệ thông tin và chuyển đổi số trong giáo dục và đào tạo giai đoạn 2022 - 2025, định hướng đến năm 2030" là một chính sách đầy triển vọng giúp sinh viên (SV) có cơ hội học tập và phát triển nghề nghiệp trong môi trường số hóa, đồng thời trang bị các kỹ năng cần thiết để hội nhập vào nền kinh tế số toàn cầu. Nhiều nghiên cứu chỉ ra rằng chuyển đổi số trong giáo dục Việt Nam không chỉ mở ra cơ hội nâng cao chất lượng đào tạo, cá nhân hóa lộ trình học tập mà còn đặt ra thách thức lớn về hạ tầng công nghệ, kỹ năng số và sự sẵn sàng của SV (Nguyen Thi Hong Nhung et al., 2024; Nguyen Minh Tri & Pham Duy Hoang, 2023). Nghiên cứu của tác giả Irwan và cộng sự cũng đã chỉ ra rằng bên cạnh những lợi ích, SV cũng gặp phải nhiều thách thức về hạ tầng công nghệ, động lực học tập và kỹ năng số khi bước vào môi trường giáo dục số (Irwan et al., 2024).

Tuy nhiên, tại Việt Nam, vẫn còn thiếu các nghiên cứu tập trung vào thực trạng những khó khăn và cơ hội của SV đại học trong bối cảnh chuyển đổi số, đặc biệt là dưới góc nhìn của chính người học. Bài báo phân tích tác động của quá trình chuyển đổi số đến SV đại học trong bối cảnh giáo dục hiện đại đồng thời nhấn mạnh rằng bước nhảy số mang lại cả thách thức lẫn cơ hội. Về thách thức, SV phải đối mặt với áp lực thích nghi nhanh chóng với công nghệ. Tuy nhiên, chuyển đổi số cũng mở ra nhiều cơ hội vàng: SV có thể tiếp cận nguồn học liệu phong phú, học tập mọi lúc mọi nơi, nâng cao các kỹ năng mềm và chuyên môn số cần thiết để đáp ứng yêu cầu của thị trường lao động toàn cầu. Bài báo này sẽ trả lời hai câu hỏi nghiên cứu sau:

(1) SV đại học đang đối mặt với những thách thức nào khi tham gia vào quá trình chuyển đổi số?

(2) Những cơ hội nổi bật nào mở ra cho SV trong môi trường học tập và làm việc số hóa?

2. CƠ SỞ LÝ LUẬN VÀ PHƯƠNG PHÁP NGHIÊN CỨU

2.1. Các khái niệm

2.1.1. Khái niệm chuyển đổi số

Theo Bộ Thông tin & Truyền thông: Chuyển đổi số là quá trình thay đổi tổng thể và toàn diện của cá nhân, tổ chức về cách sống, cách làm việc và phương thức sản xuất dựa trên các công nghệ số.

2.1.2. Khái niệm chuyển đổi số trong lĩnh vực giáo dục đại học

Hiện nay cũng chưa một khái niệm cụ thể về chuyển đổi số trong lĩnh vực giáo dục đại học nhưng “sẽ là phiến diện nếu chỉ coi chuyển đổi số đơn thuần là giảng dạy từ xa thông qua webcam mà cần phải coi chuyển đổi số như là cả một hệ sinh thái đào tạo hiện đại với nhiều thách thức mới, cơ hội mới.” (Vũ Hải Quân, 2021) Ta có thể thấy chuyển đổi số

không chỉ là công cụ hỗ trợ mà còn là yếu tố then chốt trong việc xây dựng một môi trường học tập hiện đại, linh hoạt và đáp ứng nhu cầu của xã hội trong thời đại công nghệ số.

2.2. Các lý thuyết nền tảng liên quan đến nghiên cứu

2.2.1. Lý thuyết Đổi mới Công nghệ (Technology Acceptance Model – TAM)

Lý thuyết Đổi mới Công nghệ (TAM) do Davis (1989) phát triển, được xem là mô hình kinh điển giải thích lý do tại sao con người chấp nhận hoặc từ chối sử dụng một công nghệ mới. TAM nhấn mạnh hai yếu tố cốt lõi ảnh hưởng trực tiếp đến hành vi sử dụng công nghệ:

(1) Perceived Usefulness (PU) - Nhận thức về tính hữu ích: Mức độ người dùng tin rằng công nghệ đó sẽ giúp họ cải thiện hiệu quả công việc/học tập.

(2) Perceived Ease of Use (PEOU) - Nhận thức về tính dễ sử dụng: Mức độ người dùng tin rằng việc sử dụng công nghệ là không quá khó khăn hay phức tạp.

Như vậy, Đối với SV, nếu nhận thấy các công cụ học tập số hữu ích và dễ sử dụng, các em sẽ có xu hướng chấp nhận, chủ động sử dụng nhiều hơn. Ngược lại, nếu người học cảm thấy phức tạp thì rào cản công nghệ sẽ làm giảm động lực học tập.

2.2.2. Thuyết Tự quyết (Self – Determination Theory – SDT)

Self-Determination Theory (SDT) do Deci & Ryan (1985) xây dựng là lý thuyết động lực nổi tiếng trong giáo dục và tâm lý học. SDT khẳng định con người có ba nhu cầu tâm lý bẩm sinh cần được thỏa mãn để duy trì động lực nội tại:

(1) Competence (Năng lực): Mong muốn được làm tốt một việc, cảm thấy bản thân có khả năng kiểm soát và thành thạo kỹ năng mới.

(2) Autonomy (Tự chủ): Mong muốn được lựa chọn, kiểm soát hành động của mình thay vì bị ép buộc.

(3) Relatedness (Liên kết): Nhu cầu được kết nối, tương tác và cảm thấy thuộc về một cộng đồng.

Như vây, trong bối cảnh học tập số, nếu SV không được hỗ trợ đầy đủ về kỹ năng số (Nhu cầu về năng lực), không làm chủ được thời gian và cách thức học tập (Nhu cầu về sự tự chủ) và thiếu tương tác với giảng viên, bạn bè (Nhu cầu về sự kết nối xã hội) thì động lực học sẽ giảm mạnh. Đây chính cũng là những nguyên nhân lý giải vì sao nhiều SV thiếu động lực trong môi trường học trực tuyến.

2.2.3. Tổng quan các khó khăn và cơ hội của sinh viên trong chuyển đổi số.

Tổng quan các nghiên cứu trước đây cho thấy quá trình chuyển đổi số trong giáo dục đại học tại Việt Nam đang đối mặt với nhiều thách thức đáng kể và ảnh hưởng trực tiếp đến khả năng tiếp cận và hiệu quả học tập của sinh viên. Các khó khăn nổi bật được ghi nhận bao gồm những hạn chế về: (1) Hạ tầng công nghệ, đặc biệt ở vùng sâu vùng xa (UNESCO, 2022); (2) Áp lực tài chính do chi phí thiết bị, internet, phần mềm học tập (Vũ Thị Huỳnh Nga, 2022); (3) Động lực học tập giảm vì thiếu kết nối và hỗ trợ (Deci & Ryan, 1985); (4) Thiếu đồng bộ trong chiến lược chuyển đổi số của một số trường đại học Việt Nam (Tran Mai Uoc, 2023).

Bên cạnh những thách thức đó, nhiều nghiên cứu cũng chỉ ra rằng chuyển đổi số mang đến cho SV những cơ hội quan trọng trong thời đại số hóa. Cụ thể, SV được tạo điều kiện học tập linh hoạt mọi lúc, mọi nơi, tiếp cận tri thức toàn cầu (David, 2023). Đồng thời, quá trình này giúp SV phát triển kỹ năng số, năng lực tự học. Đặc biệt, chuyển đổi số mở ra cơ hội kết nối với các nhà tuyển dụng, mở rộng mạng lưới nghề nghiệp thông qua nền tảng số (Irwan et al., 2024).

Nhìn chung, chuyển đổi số trong giáo dục đại học Việt Nam vừa tạo ra những cơ hội nổi bật để mở rộng tri thức và phát triển kỹ năng số cho SV, vừa đặt ra thách thức lớn liên quan đến hạ tầng, năng lực công nghệ và duy trì động lực học tập. Việc nhận diện rõ các yếu tố này là cơ sở quan trọng để định hướng chính sách hỗ trợ SV thích ứng hiệu quả và phát huy tối đa lợi thế trong môi trường giáo dục số hóa.

2.3 Phương pháp nghiên cứu:

Phương pháp khảo sát kết hợp giữa định lượng và định tính. Đối tượng khảo sát là SV hai trường đại học tại thành phố Hồ Chí Minh. Công cụ khảo sát bằng phiếu trực tiếp và phiếu online trên Google Form sử dụng thang đo Likert 5 mức độ và câu hỏi mở thu thập quan điểm cá nhân. Nội dung khảo sát về những khó khăn và cơ hội khi SV tiếp cận với môi trường học tập số hóa. Mẫu phản hồi nghiên cứu nhận được là 150, sau khi làm sạch dữ liệu với việc loại bỏ các bản

trả lời bị thiếu, độ tin cậy thấp thì có thể đưa vào phân tích là 142. Đối với dữ liệu định lượng được thống kê mô tả bằng công cụ Excel để xác định tỉ lệ và xu hướng; dữ liệu định tính được thống kê, phân tích từ các câu trả lời mở. Mẫu khảo sát được mô tả như sau:

Bảng 1. Tổng quan về đặc điểm các sinh viên tham gia khảo sát

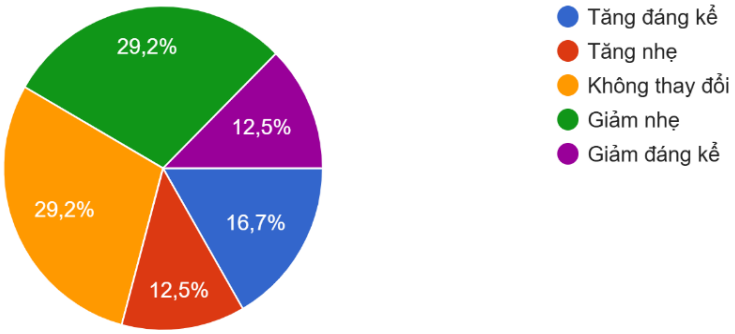
Đặc điểm		Số lượng	Tỷ lệ (%)
Giới tính	Nam	67	44,67%
	Nữ	83	55,33%
Trường Đại học Sài Gòn	Năm nhất	15	10,00%
	Năm hai	20	13,33%
	Năm ba	20	13,33%
	Năm Cuối	20	13,33%
Trường Đại học Sư Phạm Thành phố Hồ Chí Minh	Năm nhất	15	10,00%
	Năm hai	20	13,33%
	Năm ba	20	13,33%
	Năm cuối	20	13,33%

3. KẾT QUẢ NGHIÊN CỨU

3.1. Những thách thức của sinh viên trong thời đại chuyển đổi số

3.1.1. Động lực học tập:

Theo Ajzen & I Fishbein (1980) cho rằng "thái độ quan hệ chặt chẽ với hành vi, cá nhân có thái độ tích cực sẽ có nhiều nỗ lực để thích ứng với các điều kiện, hoàn cảnh để mong đạt đến mục tiêu đặt ra". Tuy nhiên, theo thống kê thực tế thì có 29,2% SV cho rằng động lực học tập không thay đổi và 29,2% SV cảm thấy động lực học tập giảm nhẹ khi chuyển sang học tập trực tuyến.



Biểu đồ 1. Minh họa câu trả lời của sinh viên khi được hỏi: Bạn cảm thấy động lực học tập của mình thay đổi như thế nào khi chuyển sang học trực tuyến?

Khi sinh viên được khảo sát cụ thể về lý do làm động lực học tập không tăng lên đáng kể thì câu trả lời nhiều nhất là do: "Sinh viên dễ bị phân tâm với thiết bị công nghệ hoặc không gian học tập không lý tưởng". Nguyên nhân là do việc học trực tuyến làm giảm kết nối xã hội - yếu tố cốt lõi tạo nên động lực nội tại theo SDT (Deci & Ryan, 1985). Điều này làm giảm động lực học tập, khiến SV dễ bỏ cuộc, ảnh hưởng đến chất lượng tiếp thu kiến thức và kết quả học tập.

3.1.2. Điều kiện tài chính giữa các sinh viên để đáp ứng việc tiếp cận với công nghệ

Theo thống kê thực tế, có 83,3% SV cho rằng "điều kiện kinh tế gia đình hoặc cá nhân" là yếu tố cao nhất gây cản trở cho các em trong việc tiếp cận các công cụ học tập online. Điều này không khó để hình dung vì "khoản thu trợ cấp từ bố mẹ và tiền công từ việc làm thêm là hai thu nhập chính của SV cũng là nguồn thu có sự sụt giảm mạnh nhất do tác động của đại dịch COVID-19" (Vũ Thị Huỳnh Nga, 2022, p. 56) diễn ra cùng thời đại với bối cảnh chuyển đổi số. Cụ thể như sau:

– Thiết bị học tập: Để tham gia vào các lớp học trực tuyến, SV cần có máy tính, điện thoại thông minh, máy tính bảng,

hoặc các thiết bị hỗ trợ khác.

– Gói cước Internet: SV học online thường cần nhiều băng thông hơn so với việc lướt web hay xem video thông thường.

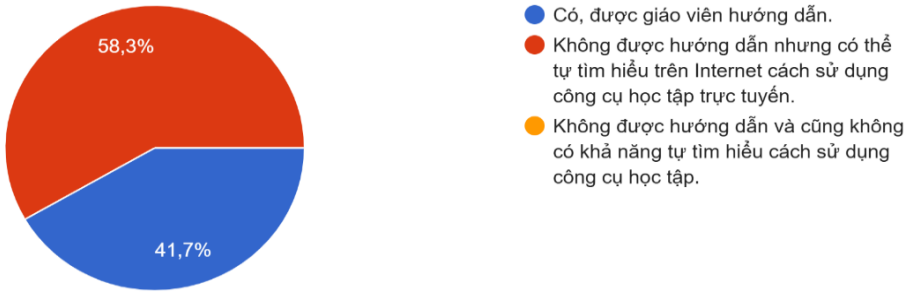
– Khả năng chi trả cho các dịch vụ học tập trực tuyến: Các dịch vụ học tập trực tuyến có thể yêu cầu chi phí đăng ký hoặc mua bản quyền sử dụng.

Vì vậy, có thể nhận thấy rằng nếu áp lực tài chính kéo dài có khả năng dẫn đến nhiều SV phải từ bỏ hoặc hạn chế các cơ hội học tập mở rộng, từ đó ảnh hưởng đến triển vọng nghề nghiệp trong tương lai.

3.1.3. Cách sử dụng công cụ học tập

Sự chênh lệch không quá lớn trong thống kê thực tế thể hiện rằng 58,3% SV "không được hướng dẫn nhưng có thể tự tìm hiểu trên internet cách sử dụng công cụ học tập trực tuyến". Mặc dù họ có khả năng tự học tốt, tự chủ động trong việc tiếp cận công nghệ nhưng cũng không tránh khỏi nhiều khó khăn nếu định hướng chưa đúng đắn và chưa tận dụng được tối đa các tính năng của công cụ. Bên cạnh đó, 41,7% SV "Có được giảng viên hướng dẫn cách sử dụng công cụ học tập" cho thấy một số giảng viên đã tích cực hỗ trợ SV trong học tập số hóa nhưng tỉ lệ này vẫn chưa cao có thể do giảng viên chưa quen với việc tích hợp công nghệ vào dạy học hoặc thiếu thời gian và nguồn lực để tổ chức các buổi hướng dẫn chi tiết.

Điều này phản ánh đúng thực tế mà tác giả Nguyen Minh Tri và cộng sự (2023) chỉ ra rằng kỹ năng số chưa đồng đều giữa các nhóm SV, làm ảnh hưởng đến hiệu quả học tập trong môi trường số. Nguyên nhân xảy ra là do kỹ năng số không đồng đều, đặc biệt là nhóm SV ít điều kiện tiếp cận sớm với công nghệ (Nguyen Minh Tri & Pham Duy Hoang, 2023). Điều này làm giảm khả năng làm chủ các nền tảng số, ảnh hưởng đến kết quả học tập và sự tự tin của SV trong môi trường số hóa. Hơn nữa theo thuyết TAM (Davis, 1989), nếu SV cảm thấy công nghệ khó tiếp cận thì họ sẽ giảm tiếp nhận và chủ động tham gia học tập số.



Biểu đồ 2. Minh họa câu trả lời của sinh viên khi được hỏi: Bạn có được đào tạo hoặc hướng dẫn đầy đủ về cách sử dụng các công cụ học tập trực tuyến không?

3.1.4. Kết nối Internet và cơ sở hạ tầng của trường học:

Có thể khẳng định kết nối Internet đóng vai trò then chốt, ảnh hưởng trực tiếp quá trình học tập của SV trong môi trường số hóa. Không dừng lại ở việc là một phương tiện kết nối, chất lượng đường truyền còn quyết định khả năng tiếp cận kiến thức, hiệu quả tiếp thu và kết quả đánh giá học tập của người học. Thực tế cho thấy 45,8% SV nhận thấy "sự chênh lệch trong cơ sở vật chất của trường học" là yếu tố khách quan mà các em không thể tránh khỏi gây ra những hệ lụy như sau:

– Khả năng tiếp cận tài liệu học tập: SV có thể bỏ lỡ các buổi học quan trọng hoặc nội dung học tập cần thiết.

– Chất lượng bài giảng: video có thể bị giật, gián đoạn làm giảm thiểu khả năng hiểu bài.

– Khó khăn trong việc làm bài tập và kiểm tra trực tuyến: Internet yếu hoặc bị gián đoạn có thể khiến SV không nộp bài tập hoặc tham gia kiểm tra trực tuyến đúng hạn.

Thực trạng này cũng được David (2023) nhấn mạnh như một trong những rào cản lớn khi triển khai giáo dục số tại các nền kinh tế đang phát triển. Điều đáng lo ngại hơn, những gián đoạn này không chỉ ảnh hưởng tức thời mà còn tiềm ẩn nguy cơ kéo dài đến tiến độ học tập, suy giảm chất lượng đào tạo, làm trầm trọng thêm khoảng cách về cơ hội học tập và tiếp cận tri thức giữa các nhóm sinh viên.

3.1.5. Giảm sự tương tác giữa giảng viên và sinh viên

Một trong những thách thức đáng kể mà SV gặp phải trong quá trình học tập trực tuyến chính là sự suy giảm rõ rệt mức độ tương tác với giảng viên và bạn học - yếu tố vốn đóng vai trò quan trọng trong việc duy trì động lực và nâng cao hiệu quả học tập. Việc thiếu sự hướng dẫn trực tiếp và kịp thời của GV sẽ làm cho quá trình học tập của SV trở nên khó khăn và kém hiệu quả. Ngoài ra, học trực tuyến với sự tương tác hạn chế có thể khiến SV thiếu cơ hội học hỏi, trao đổi và làm việc nhóm với giảng viên và bạn học, từ đó làm giảm cơ hội phát triển toàn diện. Điều này một lần nữa củng cố nhận định của Irwan và cộng sự (2024) rằng hạn chế tương tác là thách thức lớn nhất của giáo dục số đối với SV. Ngoài ra, nghiên cứu của Trần Mai Ước (2023) cũng chỉ ra rằng sự thiếu đồng bộ trong chiến lược chuyển đổi số của các trường đại học Việt Nam cũng là một rào cản lớn, khiến SV gặp khó khăn trong việc tiếp cận và thích nghi với môi trường học tập số hóa.

3.1.6. Các yếu tố khác:

Ngoài các yếu tố trên, theo kết quả thống kê còn có các yếu tố khác như: Thiếu sự hỗ trợ từ bạn bè (30,4%) có thể khắc phục được bằng cách kết nối với bạn bè để sắp xếp lịch học chung để giúp đỡ lẫn nhau. Ngoài ra, việc thiếu khả năng lựa chọn tài liệu học tập trong cơ sở dữ liệu (13%) và thiếu tài liệu học tập phù hợp (13%) cũng có thể khắc phục được.

3.2. Những cơ hội của sinh viên trong thời đại chuyển đổi số

"Việc số hóa giáo dục đại học mang lại những lợi thế đáng kể, vì nó trao cho sinh viên quyền tự do tiếp cận các nguồn giáo dục theo ý muốn và từ mọi địa điểm." (David, 2023) Thật vậy, trong thời đại chuyển đổi số, việc học không còn bị giới hạn bởi không gian và thời gian. SV có thể tham gia các khóa học trực tuyến từ các trường đại học danh tiếng trên thế giới, truy cập tài liệu học tập đa dạng, và kết nối với các chuyên gia trong lĩnh vực.

3.2.1. Cơ hội hiện tại của sinh viên ngay khi còn ngồi trên giảng đường đại học

Giáo dục số được đánh giá là một trong những xu hướng tất yếu giúp xóa bỏ rào cản địa lý và thời gian, mở rộng không gian học tập cho SV trên toàn cầu (David, 2023). Trong bối cảnh đó, SV nhận thức rõ những cơ hội nổi bật mà chuyển đổi số mang lại đối với việc học tập và phát triển cá nhân, thể hiện qua một số khía cạnh cụ thể như sau:

+ Thứ nhất, học tập mọi lúc, mọi nơi với công nghệ trực tuyến (79,2%). Cụ thể là sự bùng nổ của các nền tảng học tập trực tuyến như Coursera, Udemy, hoặc Google Classroom đã phá vỡ rào cản về thời gian và không gian trong giáo dục.

+ Thứ hai, mở rộng khả năng tiếp cận tài liệu học tập từ các trường đại học danh tiếng trên thế giới (66,7%). Thông qua các nền tảng như edX, MIT OpenCourseWare, và Khan Academy, SV có thể học trực tiếp từ những bài giảng và tài liệu của các giảng viên hàng đầu thế giới.

– Thứ ba, Phát triển kỹ năng số đáp ứng yêu cầu công việc tương lai (66,7%). Đây là những năng lực được các nhà tuyển dụng đánh giá cao trong thời đại 4.0, tạo ra lợi thế cạnh tranh cho SV khi tham gia thị trường lao động.

– Thứ tư, Gia tăng cơ hội kết nối với các chuyên gia và cộng đồng học tập toàn cầu (66,7%). SV có thể tham gia vào các dự án nghiên cứu hoặc hợp tác toàn cầu. Điều này không chỉ giúp mở rộng kiến thức mà còn xây dựng mối quan hệ nghề nghiệp quý giá.

– Cuối cùng, trải nghiệm mô hình học tập cá nhân hóa theo lộ trình cá nhân hóa dựa trên công nghệ AI (50%). Các nền tảng như Khan Academy và Duolingo ứng dụng AI để đề xuất nội dung học tập phù hợp, giúp tối ưu hóa kết quả học tập của từng cá nhân và duy trì động lực học tập.

Những cơ hội này không chỉ mang lại lợi ích trước mắt mà còn tạo nền tảng quan trọng để sinh viên phát triển toàn diện, thích ứng nhanh chóng với bối cảnh thị trường lao động ngày càng số hóa và toàn cầu hóa.

3.2.2. Những kỳ vọng của sinh viên về cơ hội tiềm năng trong tương lai nghề nghiệp

Các tác giả Erik và Andrew (2014) cũng đã phân tích về vai trò của chuyển đổi số trong việc thay đổi cách thức tuyển dụng và mở rộng cơ hội nghề nghiệp toàn cầu. Đáng chú ý, nghiên cứu của Trần Mai Ước (2023) cũng cho thấy nếu các trường đại học xây dựng chiến lược chuyển đổi số bài bản, sinh viên sẽ có nhiều cơ hội học tập trong môi trường hiện đại, phát triển kỹ năng số và thích ứng tốt hơn với thị trường lao động số hóa. Kết quả khảo sát cho thấy SV có những kỳ

vọng rất rõ ràng về tiềm năng nghề nghiệp trong thời đại số, thể hiện ở các khía cạnh sau:

– Thứ nhất, SV kỳ vọng được kết nối với các chuyên gia và nhà tuyển dụng thông qua mạng lưới số hóa (75%). Các nền tảng số như LinkedIn, GitHub, hoặc các diễn đàn nghề nghiệp sẽ trở thành cầu nối giúp họ tương tác trực tiếp với các chuyên gia hàng đầu trong lĩnh vực.

– Thứ hai, SV mong muốn được tham gia các nền tảng tuyển dụng và việc làm trực tuyến (66,7%). Nền tảng tuyển dụng trực tuyến như TopCV, VietnamWorks, hay Glassdoor cho phép sinh viên tiếp cận nhiều cơ hội việc làm ngay khi còn đang học tập.

– Thứ 3, SV nhận thức rõ tầm quan trọng của việc xây dựng hồ sơ cá nhân (50%). Việc phát triển hồ sơ cá nhân ấn tượng qua các công cụ số như LinkedIn hay Behance không chỉ giúp họ xây dựng thương hiệu cá nhân mà còn tạo ấn tượng tốt với nhà tuyển dụng.

Có thể thấy, những kỳ vọng này không chỉ thể hiện sự chủ động, sẵn sàng hội nhập của SV trong kỷ nguyên số mà còn là cơ sở quan trọng để các trường đại học, doanh nghiệp và nhà hoạch định chính sách thiết kế các chương trình đào tạo, hỗ trợ phù hợp, giúp sinh viên tận dụng tối đa cơ hội nghề nghiệp trong bối cảnh thị trường lao động ngày càng số hóa và toàn cầu hóa.

4. KẾT LUẬN:

Nhìn chung, mọi vấn đề đều có hai mặt của nó, việc chuyển đổi số trong giáo dục đại học cũng không ngoại lệ. “Mặc dù chuyển đổi số mang lại nhiều thách thức, nhưng cơ hội nó mang lại lớn hơn nhiều. Với cách tiếp cận đúng đắn và nỗ lực hợp tác, chúng ta có thể tạo ra một hệ thống giáo dục toàn diện hơn, phù hợp hơn, hiệu quả hơn.” (Irwan et al., 2024, p. 3255). Điều đó có nghĩa là, chúng ta nên nhìn ra được những thách thức mà mỗi cá nhân đang gặp phải để có hướng khắc phục và biến những khó khăn thành cơ hội. Vì sao lại nói đây là cơ hội vàng? Bởi vì chuyển đổi số không chỉ đơn thuần là một xu hướng mà còn là một cuộc cách mạng trong giáo dục, mở ra những tiềm năng chưa từng có. Đây là cơ hội để phá vỡ các rào cản về thời gian, không gian, và tài nguyên, giúp sinh viên tiếp cận nền giáo dục chất lượng cao từ bất kỳ đâu. Hơn nữa, nó tạo điều kiện để các cá nhân phát triển toàn diện, không chỉ về kiến thức mà còn cả kỹ năng số và tư duy sáng tạo – những yếu tố được đánh giá cao trong thế kỷ 21.

Chuyển đổi số còn mang lại cơ hội vàng trong việc tăng cường sự kết nối giữa sinh viên và thị trường lao động. Các nền tảng học tập và mạng xã hội nghề nghiệp trực tuyến giúp sinh viên không chỉ học tập mà còn xây dựng mối quan hệ với các chuyên gia, nhà tuyển dụng, và đồng nghiệp từ khắp nơi trên thế giới. Nhờ đó, sinh viên có thể nắm bắt các cơ hội nghề nghiệp một cách chủ động và toàn diện hơn. Như vậy, chính những thách thức của chuyển đổi số đã làm nổi bật giá trị của cơ hội này. Nếu biết tận dụng và khai thác đúng cách, chuyển đổi số sẽ không chỉ giúp sinh viên nâng cao chất lượng học tập mà còn tạo nền tảng vững chắc cho sự phát triển bền vững của xã hội trong tương lai.

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TÁC ĐỘNG CỦA CÔNG NGHỆ 4.0 ĐẾN GIÁO DỤC ĐẠI HỌC: BÀI HỌC TỪ NHẬT BẢN

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TÓM TẮT

Bài viết tập trung phân tích những xu hướng ứng dụng công nghệ trong giáo dục đại học toàn cầu, nhấn mạnh thành tựu nổi bật của Nhật Bản và bài học đề ra cho Việt Nam. Trong bối cảnh Cách mạng Công nghệ 4.0, giáo dục đại học đang trở thành nền tảng trung tâm trong việc chuẩn bị nguồn nhân lực cho tương lai.

Những xu hướng như cá nhân hóa học tập, hệ sinh thái khởi nghiệp, và đại học trực tuyến đã giúp Nhật Bản đạt được nhiều bước tiến quan trọng.

Tại Việt Nam, việc đổi mới hệ thống giáo dục đại học cần được xây dựng dựa trên những đề xuất đã được minh chứng. Các bài học quan trọng bao gồm: đầu tư vào hạ tầng công nghệ, tính linh hoạt trong các chương trình học tập, và kết nối chặt chẽ giữa giáo dục và thị trường lao động. Việc nâng cao năng lực chuyên môn cho giảng viên và khuyến khích sinh viên tham gia khởi nghiệp cũng là những điểm mạnh cần được tăng cường.

Bài viết đặt nặng tầm quan trọng vào việc đề xuất một nền giáo dục bền vững cho Việt Nam, dựa trên xem xét kinh nghiệm thành công từ Nhật Bản, được điều chỉnh theo đặc thù văn hoá xã hội của Việt Nam.

Từ khoá: Cách mạng Công nghệ 4.0, giáo dục đại học, kinh nghiệm Nhật Bản

1. PHẦN MỞ ĐẦU

1.1. Giáo dục đại học – từ các mục tiêu cốt lõi nguyên thuỷ đến yêu cầu của thời đại công nghệ

Đại học, và nền giáo dục đại học, đã ra đời và tồn tại từ khá lâu trong lịch sử nhân loại. Nếu lấy cột mốc năm 859 mà tổ chức UNESCO đã xác định là thời điểm trường đại học đầu tiên trên thế giới xuất hiện, với sự ra đời của Đại học Al-Qarawiyyin (một cách gọi khác là Al-Karaouine) tại Fez, Morocco (Abdouni H., 2021, tr. 789), thì mô hình giáo dục đại học đã tồn tại cùng chúng ta gần mười hai thế kỷ.

Mục tiêu của mô hình giáo dục ấy là gì? Nói một cách đơn giản hoá, mục tiêu của nó là thực hiện các chức năng nghiên cứu và giảng dạy ở trình độ "giáo dục cao" (higher education). Tuy nhiên, chúng ta cần phải nhìn sâu hơn vào các mục tiêu cốt lõi mà nó chứa đựng, những mục tiêu đã tồn tại qua cả thiên niên kỷ và vẫn còn giá trị trong hiện tại. Đó không gì khác hơn là gìn giữ những tri thức và sự thật của nhân loại; kế thừa, phát triển và chuyển giao tri thức; trên nền tảng đó đào tạo ra những cá thể mang tính toàn diện về năng lực và nhân cách có ích cho dân sinh; thúc đẩy những tiến bộ xã hội. Trong thời đại ngày nay, chúng ta có thể thêm vào đó một mục tiêu mới là kết nối toàn cầu.

Trong bối cảnh của Công nghiệp 4.0 hiện nay, nền giáo dục đại học đang đứng trước một thách thức chuyển mình mang tính cách mạng. Công nghiệp 4.0 với sự phát triển mạnh mẽ, liên tục, nhanh chóng của trí tuệ nhân tạo, dữ liệu lớn, tự động hóa đã làm thay đổi cách thức con người học tập, nghiên cứu và làm việc. Những công nghệ này không chỉ tác động đến nội dung tri thức cần được giảng dạy mà còn định hình phương pháp giảng dạy và các mô hình giáo dục mới. Vai trò của giáo dục đại học giờ đây không chỉ dừng lại ở việc đào tạo những con người có tri thức mà còn phải trang bị cho họ năng lực thích nghi nhanh chóng, khả năng học tập suốt đời và tư duy sáng tạo liên tục.

Công nghiệp 4.0 cũng mở ra cơ hội kết nối toàn cầu sâu rộng, cho phép các trường đại học hợp tác với nhau thông qua những nền tảng kỹ thuật số tiên tiến. Sinh viên và giảng viên từ các quốc gia khác nhau có thể cùng xem xét giải quyết các vấn đề mang tính toàn cầu, thúc đẩy sự hội nhập không biên giới trong công việc nghiên cứu khoa học. Đi kèm với cơ hội được mở ra ấy là những thách thức không nhỏ, đặc biệt khi nền giáo dục đại học phải đối mặt với áp lực đổi mới để bắt kịp sự thay đổi liên tục của công nghệ và thị trường lao động.

Trong tình hình ấy, khu vực giáo dục đại học cần nhận thức và nhận diện rõ những lợi ích cũng như thách thức của thời đại Công nghiệp 4.0, để từ đó đưa ra các chiến lược thích ứng phù hợp. Một điều tra xã hội học gần đây với các đối

tượng khác nhau của khu vực này từ King Saud University (Mian S. H., 2020, tr. 17) cho kết quả, hơn 75% số người được phỏng vấn cho rằng quá trình chuyển đổi số sang Công nghiệp 4.0 có thể cải thiện khả năng cạnh tranh của trường đại học, và chỉ có ít hơn 10% cho biết họ không đồng ý và đưa ra phản hồi tiêu cực.

1.2. Mô hình Nhật Bản: vì sao Việt Nam nên học hỏi từ mô hình này

Với dân số 127 triệu người, Nhật Bản có hơn 2,8 triệu sinh viên theo học tại gần 1.200 cơ sở giáo dục bậc cao (HEI) bao gồm 778 trường đại học và 395 trường cao đẳng (số liệu năm 2018, Jung I., 2022, tr. 215). Cũng theo Jung, gần đây giáo dục đại học Nhật Bản tập trung cải cách các nội dung: 1) tăng cường chức năng của các loại HEI khác nhau bằng cách trao quyền cho từng trường đại học; 2) cải thiện chất lượng học tập để ứng phó với những thay đổi trong tương lai và tạo ra các giá trị mới; 3) chứng minh chất lượng giáo dục đại học ở mỗi địa phương, xem xét những thay đổi về nhân khẩu học trong toàn bộ hệ thống giáo dục đại học và 4) giải quyết các vấn đề liên quan đến tính đa dạng, tính linh hoạt và đảm bảo chất lượng (Jung I., 2022, tr. 215).

Việt Nam có dân số 101 triệu người vào năm 2024. Số liệu thống kê cũng cho biết vào thời điểm năm 2022, Việt Nam có 242 trường đại học với trên 2 triệu sinh viên. Số trường cao đẳng là trên 200 trường với xấp xỉ 500.000 sinh viên (2016).

Có thể thấy mật độ sinh viên trên số cơ sở trường của Việt Nam so với Nhật Bản là khá lớn, và tạo sức ép lên việc tổ chức giảng dạy. Như vậy, nhu cầu ứng dụng công nghệ trong tổ chức giảng dạy của Việt Nam để giảm bớp áp lực này là rất cao đối với giáo dục đại học của Việt Nam.

Nhật Bản đạt được mức độ quan tâm đối với nghị trình thích ứng và ứng dụng công nghệ 4.0 vào giáo dục ở cả hai cấp độ: cấp độ chính phủ và cấp độ tổ chức giáo dục. Sức ép nhân khẩu học chỉ là một động lực thứ yếu, động lực chính chính là đuổi kịp xu thế để thực hiện tốt vai trò của tổ chức trong guồng phát triển chung của xã hội.

Thủ tướng Nhật Bản Shinzo Abe phát biểu tại Hội chợ Tin học CeeBIT 2017 như sau: "công nghệ không nên được coi là mối đe dọa, mà là một sự hỗ trợ", khi ông viện dẫn về khái niệm "Xã hội 5.0". Xã hội 5.0 đối với Nhật Bản bao hàm trong nó Đại học 4.0. Khái niệm Đại học 4.0 được thể hiện như một sự đổi mới trong hệ thống giáo dục đại học trong quá trình số hóa các cơ sở giáo dục đại học. Hệ thống giáo dục này được coi là sự chuyển đổi từ giáo dục truyền thống sang các mô hình giáo dục liên tục và không bị gián đoạn trong đó sử dụng nhiều hệ thống dựa trên các tiến bộ về công nghệ thông tin. "Đại học 4.0 nhấn mạnh rằng các cơ sở giáo dục đại học nên coi mình là các cơ sở phát triển nhiều dự án và bắt đầu các ứng dụng mới dựa trên việc phát triển các hệ thống công nghệ tiên tiến theo nhu cầu của thời đại số".

Giáo sư Kan Hiroshi Suzuki từ Đại học Tokyo phát biểu: "Nghiên cứu đổi mới giáo dục nhằm đáp ứng những thay đổi lớn trong cơ cấu ngành và cơ cấu xã hội nói chung – những cơ cấu còn được gọi là Cuộc cách mạng công nghiệp lần thứ 4 và Xã hội 5.0 là cần thiết".

Nhật Bản đã có những bước đi đáng kể trong việc áp dụng thành tựu công nghệ 4.0 vào hệ thống giáo dục đại học, trên các bình diện xây dựng chiến lược, cấu trúc chính sách và định hướng thái độ xã hội.

Chính phủ Nhật Bản đã triển khai nhiều sáng kiến quan trọng trong khuôn khổ "e-Japan Strategy" nhằm đáp ứng nhu cầu số hóa học tập. Mục tiêu là tạo ra một hệ thống có khả năng truy cập giáo dục dù ở bất cứ vị trí địa lý nào hay là một cá nhân nào chăng nữa. Hệ thống kết nối toàn bộ các lớp học vào Internet, nâng cấp hệ thống truyền thông số cao tốc giúp Nhật Bản trở thành một trong những quốc gia đi đầu về ứng dụng công nghệ thông tin trong lĩnh vực giáo dục.

Về bước đi cụ thể, có thể lấy một số ví dụ tiêu biểu từ bài phân tích của Colin Lachem và cộng sự (2008, tr. 610): Chương trình "Đại học trên sóng" (University of the Air) đi tiên phong trong việc cung cấp các khóa học từ xa từ năm 1985, sử dụng truyền hình và vô tuyến. Hiện nay, nó phục vụ gần 100.000 sinh viên và đã mở rộng sang hình thức học trực tuyến.

Những sáng tạo nội dung số từ các đại học như Tokyo, Kyoto và Waseda đã triển khai các nội dung học tập kết hợp (blended learning), sử dụng hệ thống WebCT, Blackboard để đáp ứng nhu cầu tương tác cao của sinh viên.

Chương trình phục vụ cộng đồng, qua đó các đại học đã tài trợ cho những nỗ lực như "WIDE Initiative" để cung cấp các khóa học liên trường, giúp sinh viên và giáo viên chia sẻ nguồn tài nguyên.

Và nhiều sáng kiến khác từ cộng đồng doanh nghiệp Nhật Bản.

Những tương đồng về văn hoá, địa lý, triết lý giáo dục, định hướng tương lai, nguyên tắc hội nhập quốc tế giữa hai

nước Việt Nam và Nhật Bản, mối quan hệ đa phương hữu hảo giữa hai nước, những kinh nghiệm thực tiễn phong phú từ Nhật Bản là cơ sở để Việt Nam đặt niềm tin và việc vận dụng bài học của quốc gia này vào quá trình xây dựng chiến lược thích ứng Công nghệ 4.0 cho lĩnh vực giáo dục đại học của chính mình.

2. Bài học từ Nhật Bản cho Việt Nam

2.1. Các xu hướng toàn cầu trong ứng dụng công nghệ vào giáo dục đại học

Trên quy mô toàn cầu, cuộc Cách mạng Công nghệ 4.0 đã tác động mạnh mẽ đến giáo dục đại học, dẫn đến những thay đổi sâu sắc, đưa công nghệ đóng vai trò trung tâm trong việc định hình tương lai của việc học tập và giảng dạy. Các xu hướng nổi bật được nhận diện phổ biến nhất có thể được tóm tắt như sau (Altbach P. G., 2009, tr. 23, 89), (Duderstadt J. J., 2009, tr. 26), (Fisk P., 2017, tr. 1):

Cá nhân hóa trải nghiệm học tập

Một trong những thay đổi lớn nhất là khả năng cá nhân hóa giáo dục nhờ vào công nghệ. Với trí tuệ nhân tạo (AI) và học máy (machine learning), các nền tảng học tập có thể phân tích dữ liệu hành vi của người học để cung cấp các chương trình, nội dung phù hợp với nhu cầu cá nhân. Người học không còn bị giới hạn bởi một chương trình học cố định, mà có thể tự xây dựng lộ trình học tập linh hoạt dựa trên sở thích, mục tiêu và khả năng riêng.

Học tập dựa trên dữ liệu

Dữ liệu lớn (Big Data) đang được sử dụng để cải thiện hiệu quả giảng dạy và học tập. Các tổ chức giáo dục có thể theo dõi tiến độ học tập của sinh viên, đánh giá điểm mạnh và yếu, từ đó tối ưu hóa chiến lược giảng dạy. Dữ liệu còn giúp các trường đại học đưa ra quyết định chiến lược về phát triển chương trình, quản lý nguồn lực, và cải thiện dịch vụ hỗ trợ sinh viên.

Mô hình học tập kết hợp (Blended Learning)

Công nghệ đã làm mờ ranh giới giữa học tập trực tiếp và học trực tuyến. Mô hình Blended Learning kết hợp ưu điểm của cả hai phương pháp này, cho phép sinh viên vừa tham gia lớp học truyền thống vừa tiếp cận các nguồn tài liệu trực tuyến, từ video bài giảng, bài tập tương tác đến các diễn đàn trao đổi. Xu hướng này đang giúp tối ưu hóa sự linh hoạt và khả năng tương tác trong học tập.

Học tập suốt đời (Lifelong Learning)

Giáo dục đang được tái định nghĩa không chỉ dành cho sinh viên ở độ tuổi truyền thống, mà mở rộng ra cả người trưởng thành với nhu cầu cập nhật kỹ năng và kiến thức. Các nền tảng học tập trực tuyến tập trung vào các kỹ năng cụ thể, giúp cá nhân cập nhật kiến thức để thích ứng với yêu cầu thay đổi liên tục của thị trường lao động.

Tự động hóa trong quản lý và giảng dạy

Nhiều quy trình trong giáo dục đại học đã được tự động hóa, từ chấm điểm, quản lý thời khóa biểu đến tư vấn học tập. Chatbot và các công cụ tự động hóa đang hỗ trợ giảng viên và sinh viên, giúp tiết kiệm thời gian và nâng cao hiệu quả quản lý. Công nghệ này cũng giải phóng giảng viên để họ tập trung vào giảng dạy và nghiên cứu chuyên sâu.

Kết nối toàn cầu

Với sự hỗ trợ của Internet và các nền tảng công nghệ, sinh viên ngày nay có thể tiếp cận tài nguyên học tập từ bất kỳ đâu trên thế giới. Các trường đại học đang xây dựng quan hệ hợp tác quốc tế, triển khai các chương trình liên kết, và thúc đẩy việc học tập xuyên biên giới thông qua các khóa học trực tuyến toàn cầu.

Tích hợp giáo dục với nhu cầu thị trường lao động

Công nghệ đang làm thay đổi bản chất của công việc và yêu cầu về kỹ năng. Giáo dục đại học cần thích ứng nhanh với sự thay đổi này bằng cách tích hợp các công nghệ mới và thiết kế chương trình giảng dạy linh hoạt, nhằm đào tạo ra lực lượng lao động sẵn sàng đáp ứng nhu cầu thực tiễn. Các lĩnh vực như dữ liệu, AI, blockchain và kỹ thuật số đang trở thành trọng tâm trong đào tạo.

Học tập xã hội và dựa trên dự án

Mặc dù công nghệ số đóng vai trò quan trọng, các mô hình học tập dựa trên sự hợp tác và dự án vẫn được chú trọng. Công nghệ hiện đại đang tạo ra các công cụ cho phép sinh viên làm việc nhóm hiệu quả hơn, bất kể khoảng cách địa lý.

Các xu hướng toàn cầu trong giáo dục đại học không chỉ phản ánh sự phát triển công nghệ mà còn thể hiện sự chuyển dịch từ mô hình truyền thống sang những cách tiếp cận linh hoạt, toàn diện và bền vững hơn. Nhật Bản, cũng như nhiều quốc gia tiên tiến khác, đang tận dụng các xu hướng này để định hình một nền giáo dục hiện đại, phục vụ cho nhu cầu của cả cá nhân và xã hội trong thời đại mới.

2.2. Các chương trình và thành tựu nổi bật của Nhật Bản

Nhật Bản triển khai nhiều chương trình đồng bộ để tăng cường khả năng thích ứng và tận dụng công nghệ 4.0 trong giáo dục đại học:

Chương trình "Society 5.0"

Nhật Bản đặt mục tiêu biến xã hội trở thành một xã hội thông minh tối đa, trong đó giáo dục đóng vai trò trung tâm. Các trường đại học đã áp dụng AI và Big Data để theo dõi hành vi và hiệu suất học tập của sinh viên.

Triển khai đại học trực tuyến

Các trường đại học như Tokyo, Kyoto, và Osaka đã tăng cường nền tảng học tập trực tuyến, kết hợp cá nhân hóa và các công nghệ tích hợp để đáp ứng nhu cầu học tập linh hoạt.

Hệ sinh thái khởi nghiệp

Nhật Bản đã tạo nên một hệ sinh thái khởi nghiệp tại các trường đại học nhằm đào tạo các nhà lãnh đạo doanh nghiệp tương lai và thúc đẩy đổi mới sáng tạo.

Các chương trình này đem đến tác động tích cực cho các bên liên quan trong quá trình đào tạo giảng dạy, cả quá trình sử dụng lao động sau giảng dạy, và cho cả xã hội.

Đối với sinh viên

Nhờ ứng dụng các công nghệ tiên tiến như trí tuệ nhân tạo (AI), học máy, và dữ liệu lớn (Big Data), sinh viên tại các trường đại học Nhật Bản được hưởng lợi đáng kể. Các nền tảng học tập trực tuyến không chỉ cung cấp tài liệu phong phú mà còn hỗ trợ cá nhân hóa lộ trình học tập cho từng sinh viên, dựa trên phân tích hành vi học tập, điểm số và sở thích cá nhân. Ngoài ra, việc học tập trở nên linh hoạt hơn khi sinh viên có thể truy cập các khóa học ở bất kỳ đâu và bất kỳ lúc nào. Điều này đặc biệt hữu ích đối với các sinh viên vừa học vừa làm hoặc những người sống ở các vùng nông thôn xa xôi.

Hơn nữa, các chương trình đào tạo liên kết với doanh nghiệp, cùng với các sáng kiến như hệ sinh thái khởi nghiệp trong trường đại học, giúp sinh viên không chỉ tích lũy kiến thức chuyên môn mà còn phát triển kỹ năng thực tiễn, từ quản lý dự án, tư duy sáng tạo đến khả năng làm việc trong môi trường công nghệ cao. Những sinh viên tham gia vào các dự án nghiên cứu ứng dụng công nghệ cũng được khuyến khích khám phá và hiện thực hóa ý tưởng của mình, tạo tiền đề cho sự nghiệp tương lai trong lĩnh vực công nghệ.

Đối với giảng viên

Sự hiện diện của công nghệ 4.0 trong giáo dục đại học đã mang lại nhiều thay đổi tích cực cho đội ngũ giảng viên tại Nhật Bản. Hệ thống tự động hóa giúp giảm tải công việc hành chính như chấm điểm, ghi nhận kết quả học tập hay tổ chức các bài kiểm tra trực tuyến, cho phép giảng viên tập trung hơn vào nghiên cứu khoa học và đổi mới phương pháp giảng dạy. Các công cụ phân tích dữ liệu cũng hỗ trợ giảng viên hiểu rõ hơn về nhu cầu học tập của từng sinh viên, từ đó thiết kế các bài giảng phù hợp và hiệu quả hơn.

Các trường đại học Nhật Bản cũng tích cực cung cấp cơ hội đào tạo và phát triển chuyên môn cho giảng viên, đặc biệt là trong lĩnh vực công nghệ. Thông qua các khóa học nâng cao kỹ năng sử dụng AI, Big Data và các công cụ công nghệ giáo dục, giảng viên có thể cải thiện khả năng tích hợp công nghệ vào bài giảng. Ngoài ra, việc hợp tác giữa các giảng viên và doanh nghiệp trong các dự án nghiên cứu ứng dụng giúp họ có thêm kinh nghiệm thực tế, đồng thời mở rộng mạng lưới chuyên môn.

Đối với chính phủ

Nhật Bản đã tận dụng công nghệ trong giáo dục đại học để hỗ trợ các mục tiêu phát triển quốc gia, bao gồm tăng cường năng lực cạnh tranh toàn cầu và chuyển đổi sang một nền kinh tế tri thức. Việc triển khai các chương trình như "Society 5.0" giúp chính phủ giảm gánh nặng trong việc quản lý giáo dục, đồng thời tạo điều kiện thuận lợi cho việc phát

triển chính sách dựa trên dữ liệu thực tiễn từ hệ thống giáo dục. Chính phủ cũng thu lợi từ sự liên kết chặt chẽ giữa giáo dục và các ngành công nghiệp, giúp nâng cao hiệu quả đầu tư công và đảm bảo tính bền vững cho các sáng kiến quốc gia.

Đối với doanh nghiệp

Các doanh nghiệp tại Nhật Bản được hưởng lợi trực tiếp từ nguồn nhân lực chất lượng cao do các trường đại học đào tạo, đặc biệt là những sinh viên có kỹ năng phù hợp với yêu cầu của cách mạng công nghệ 4.0. Sự kết hợp giữa doanh nghiệp và trường đại học thông qua các hệ sinh thái khởi nghiệp cũng tạo điều kiện thuận lợi cho việc chuyển giao công nghệ và phát triển các sản phẩm, dịch vụ mới. Các doanh nghiệp còn có cơ hội tham gia vào quá trình thiết kế chương trình học, đảm bảo sinh viên tốt nghiệp có thể đóng góp ngay vào lực lượng lao động và đổi mới sáng tạo.

Đối với xã hội

Tác động của các sáng kiến công nghệ trong giáo dục đại học không chỉ dừng lại ở phạm vi nhà trường mà còn lan tỏa mạnh mẽ ra toàn xã hội. Các trường đại học Nhật Bản, nhờ ứng dụng công nghệ, đã đào tạo ra nguồn nhân lực chất lượng cao, đáp ứng yêu cầu của các ngành công nghiệp hiện đại. Những cá nhân này không chỉ sở hữu kiến thức chuyên môn mà còn thành thạo các kỹ năng như tư duy sáng tạo, giải quyết vấn đề và sử dụng công nghệ.

Các nghiên cứu do trường đại học thực hiện, đặc biệt là những nghiên cứu ứng dụng công nghệ, đã góp phần giải quyết các vấn đề xã hội như giao thông, y tế, và biến đổi khí hậu. Những sáng kiến này không chỉ giúp cải thiện chất lượng cuộc sống mà còn thúc đẩy sự đổi mới trong cộng đồng.

Đáng chú ý, sự lan tỏa của công nghệ trong giáo dục cũng góp phần làm giảm khoảng cách giáo dục giữa các vùng miền, nhờ vào việc cung cấp các khóa học trực tuyến và cơ hội học tập bình đẳng. Điều này giúp nâng cao tri thức cộng đồng, đóng góp vào sự phát triển bền vững của xã hội Nhật Bản.

2.3. Bài học cho Việt Nam

Việt Nam đang ở trong giai đoạn chuyển mình quan trọng để tối ưu hóa vai trò của các cơ sở giáo dục đại học trong bối cảnh cách mạng công nghệ 4.0. Từ những kinh nghiệm và thành tựu đã được minh chứng tại Nhật Bản, chúng ta có thể rút ra cho mình nhiều bài học quan trọng, đóng góp vào việc xây dựng chiến lược đổi mới giáo dục đại học phù hợp.

Đầu tư vào hạ tầng công nghệ: Nhật Bản đã đầu tư mạnh mẽ vào hạ tầng công nghệ, tạo nên nền tảng vững chắc cho việc ứng dụng AI, Big Data, và Internet vạn vật (IoT) trong giáo dục. Việt Nam cần thêm nhiều chính sách đầu tư để nâng cấp hạ tầng kỹ thuật số tại các trường đại học. Điều này bao gồm việc đầu tư vào các phòng thí nghiệm ảo, thư viện trực tuyến, và nền tảng học liệu mở để sinh viên tiếp cận với nguồn tài nguyên giáo dục chất lượng cao. Có những ví dụ cho việc các trường đại học Việt Nam đã từng bước tiếp cận theo hướng này như trường hợp của Đại học Công nghiệp TP. Hồ Chí Minh (IUH)

Thúc đẩy tính cá nhân hóa trong học tập: Nhật Bản rất chú trọng tính cá nhân hóa trong học tập. Hệ thống cá nhân hóa được hỗ trợ bởi các thuật toán phân tích dữ liệu, giúp tối ưu hóa động lực học tập của từng sinh viên. Việt Nam có thể học hỏi cách tích hợp các công nghệ phân tích vào việc theo dõi hiệu quả học tập và từ đó đề xuất các biện pháp hỗ trợ hiệu quả.

Kết nối giáo dục với thị trường lao động: Hệ sinh thái khởi nghiệp tại Nhật Bản cho thấy tầm quan trọng của việc kết nối giáo dục với nhu cầu thực tế của thị trường lao động. Việt Nam có thể đầu tư vào các chương trình hợp tác doanh nghiệp-đại học, khuyến khích việc tài trợ nghiên cứu từ khu vực tư nhân và phát triển các trung tâm khởi nghiệp tại các trường đại học.

Phát triển đội ngũ giảng viên và nâng cao chất lượng giảng dạy: Tại Nhật Bản, các công nghệ tự động hóa như AI và machine learning đã giúp giảng viên tiết kiệm thời gian trong công tác hành chính, từ đó tập trung nhiều hơn vào nghiên cứu và đổi mới phương pháp giảng dạy. Việt Nam có thể học tập việc tạo điều kiện cho giảng viên được tham gia vào các khoá đào tạo quốc tế, tiếp cận các công nghệ hiện đại để nâng cao năng lực giảng dạy.

Thúc đẩy hệ thống giáo dục linh hoạt: Cách mạng công nghệ 4.0 yêu cầu sự linh hoạt trong việc tổ chức các chương trình học tập. Nhật Bản đã thành công trong việc triển khai các nền tảng học tập trực tuyến kết hợp với cá nhân hóa. Việt Nam có thể học tập việc đầu tư vào các công cụ học tập linh hoạt, tạo điều kiện cho người học tiếp cận các khoá học chất lượng cao từ xa.

Dựa trên những điều kiện riêng có của Việt Nam như mức độ quản lý nhà nước đối với giáo dục đại học, tính liên

kết cộng đồng, ngoài việc học hỏi từ người đi trước, Việt Nam cũng hoàn toàn có thể phát huy một số sáng kiến chưa thấy Nhật Bản áp dụng đại trà như: liên kết cộng đồng đại học theo khu vực địa lý, lãnh thổ để chia sẻ tài nguyên giảng viên, học tập nghiên cứu, công nghệ giảng dạy, thiết lập cộng đồng liên kết nhà trường-doanh nghiệp.

Những đúc kết này đã được tác giả sàng lọc và tinh chỉnh dựa trên những đặc thù về xã hội, văn hoá và mức độ phát triển của Việt Nam, đối chiếu có một mức độ khác biệt nhất định (tuy nhiên không quá lớn) đối với hình mẫu học tập là Nhật Bản. Đây cũng chính là đóng góp chính của bài tham luận này.

3. KẾT LUẬN

Giáo dục đại học trong bối cảnh Cách mạng Công nghệ 4.0 không chỉ là câu chuyện về chuyển đổi kỹ thuật số mà còn là sự cải tổ toàn diện trong triết lý giáo dục, tái tạo giá trị, và làm mới mục tiêu đào tạo. Thông qua câu chuyện thành công của Nhật Bản, bài viết mong muốn chứng minh rằng, để thích ứng và tận dụng các công nghệ tiên tiến, cần có sự kết hợp chặt chẽ giữa tầm nhìn chiến lược, đầu tư vào hạ tầng kỹ thuật, và sự linh hoạt trong chính sách và quản trị.

Những sáng kiến như "Society 5.0" hay hệ sinh thái khởi nghiệp trong giáo dục đại học Nhật Bản không chỉ đáp ứng nhu cầu thay đổi nhanh chóng của công nghệ mà còn tạo nên nền tảng giáo dục bền vững, linh hoạt, đáp ứng nhu cầu toàn cầu. Việc nhấn mạnh tính cá nhân hóa trong học tập, kết nối toàn cầu, và đổi mới phương pháp giảng dạy là những điểm sáng có thể được Việt Nam đối chiếu và vận dụng.

Với những đặc thù văn hoá, nhân khẩu, và cơ cấu kinh tế, Việt Nam hoàn toàn có thể học hỏi các chương trình đồng bộ như "e-Japan Strategy" hoặc các mô hình đại học trực tuyến tối ưu hoá. Tuy nhiên, các chính sách đó cần được tùy biến theo điều kiện thực tế trong nước. Một điểm nhấn quan trọng là sự kết nối giữa giáo dục và doanh nghiệp để đảm bảo sinh viên không chỉ được đào tạo mà còn được trang bị tốt nhất cho một thị trường lao động thay đổi nhanh chóng.

Bài học từ Nhật Bản có thể trở thành kim chỉ nam để Việt Nam định hình nền giáo dục đại học trong thời đại số. Bằng cách đầu tư hợp lý, kết nối quốc tế và khai thác hệ thống giáo dục linh hoạt, chúng ta hoàn toàn có thể nâng tầm hệ thống giáo dục đại học Việt Nam, góp phần vào phát triển kinh tế và xã hội bền vững. Trong bối cảnh Cách mạng Công nghệ 4.0, giáo dục đại học Việt Nam đang đối diện với những thách thức lớn như đầu tư hạ tầng công nghệ, tính linh hoạt trong học tập, và sự kết nối với thị trường lao động. Tuy nhiên, những kinh nghiệm đã đạt được tại Nhật Bản cung cấp những bài học quý giá, giúp Việt Nam định hướng rõ ràng cho sự phát triển giáo dục.

Việc đầu tư mạnh mẽ vào công nghệ và các chương trình đổi mới sáng tạo là yếu tố cốt lõi. Việc khai thác hiệu quả hệ sinh thái khởi nghiệp và tăng cường mối quan hệ hợp tác giữa giáo dục và doanh nghiệp là điều cần thiết để nâng cao chất lượng đào tạo và tạo ra một lực lượng lao động phù hợp với nhu cầu của xã hội hiện đại.

Những nỗ lực để nâng cao tính linh hoạt trong học tập, tích hợp công nghệ cao như AI và học trực tuyến, cũng như tăng cường khả năng cá nhân hóa là những hướng đi đúng đắn. Ngoài ra, các chính sách khuyến khích đổi mới sáng tạo trong giáo dục, đồng thời hỗ trợ giảng viên nâng cao năng lực chuyên môn, cũng đóng vai trò then chốt trong sự phát triển bền vững.

Từ đó, Việt Nam không chỉ có thể học hỏi mô hình của Nhật Bản mà còn điều chỉnh linh hoạt phù hợp với điều kiện trong nước. Sự kết hợp giữa cái nhìn toàn cầu và những nỗ lực nội tại chắc chắn sẽ giúp nâng tầm hệ thống giáo dục đại học Việt Nam trong tương lai. Xác định được hướng đi riêng, giáo dục đại học Việt Nam hoàn toàn có thể đóng góp vào một kỳ tích giáo dục mới trong thế kỷ XXI, giúp Việt Nam trở thành một quốc gia phát triển, hùng cường và đáng tự hào (Phan, 2025, tr. 28).

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CÁC NHÂN TỐ ẢNH HƯỞNG ĐẾN GIÁ TRỊ THƯƠNG HIỆU TRƯỜNG ĐẠI HỌC KHOA HỌC SỨC KHỎE

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TÓM TẮT

Trên cơ sở áp dụng lý thuyết về thương hiệu, mô hình liên quan đến giá trị thương hiệu (GTTH), tham luận "Các nhân tố ảnh hưởng đến giá trị thương hiệu Trường Đại học Khoa học Sức khỏe" đánh giá thương hiệu theo quan điểm người tiêu dùng; cụ thể là khảo sát đánh giá của sinh viên, cựu sinh viên, học viên, thầy cô của Trường với 150 mẫu bằng phiếu khảo sát được tạo qua hệ thống google form. Bằng sự hỗ trợ của phần mềm SPSS 27.0, tham luận cho thấy các nhân tố (1) Nhận biết thương hiệu; (2) Liên tưởng thương hiệu; (3) Hình ảnh thương hiệu; (4) Trung thành thương hiệu (5) Chất lượng cảm nhận, đều có tác động cùng chiều đến GTTH. Từ đó tham luận đưa ra khuyến nghị nhằm hỗ trợ Nhà trường nâng cao GTTH trong giai đoạn 2025 – 2030.

Từ khóa: chất lượng cảm nhận, hình ảnh thương hiệu, liên tưởng thương hiệu, nhận biết thương hiệu, thương hiệu, trung thành thương hiệu.

1. ĐẶT VẤN ĐỀ

Trong 15 năm qua, số lượng cơ sở giáo dục (CSGD) đại học tại Việt Nam tăng nhanh, đã tạo nên sự cạnh tranh giữa các cơ sở công lập với tư thục, trong nước và quốc tế đang hoạt động tại Việt Nam. Đồng thời, chính sách xã hội hóa giáo dục, tăng cường quyền tự chủ của các trường đại học càng làm cho vấn đề thương hiệu trở nên quan trọng để tạo danh tiếng, thu hút người học, tăng nguồn thu cho Nhà trường.

Trường Đại học Khoa học Sức khỏe (ĐH KHSK) được thành lập vào ngày 03/6/2024 trên cơ sở tiền thân là Khoa Y - Đại học Quốc gia Thành phố Hồ Chí Minh (ĐHQG-HCM). Đây là đơn vị đã có bề dày 15 năm đào tạo lĩnh vực khoa học sức khỏe. Từ tháng 6/2024, cùng với việc trở thành trường đại học thành viên thứ 8 của ĐHQG-HCM và đổi tên từ Khoa Y ĐHQG-HCM thành Trường ĐH KHSK thì việc tái định vị và nâng cao GTTH là một yêu cầu tất yếu. Tham luận này nghiên cứu tác động của các nhân tố đến GTTH Trường dựa trên dữ liệu thu thập trong 05 năm gần nhất 2020-2024 (với tên gọi Khoa Y ĐHQG-HCM), qua đó đề xuất các giải pháp giúp tạo ra lợi thế cho thương hiệu Trường trong giai đoạn phát triển mới.

2. CƠ SỞ LÝ THUYẾT VÀ MÔ HÌNH NGHIÊN CỨU

2.1. Thương hiệu

Thương hiệu (brand) được định nghĩa theo nhiều cách khác nhau. Theo Hiệp hội Marketing Mỹ (AMA) năm 1960, thương hiệu là tên, biểu tượng, ký hiệu, kiểu dáng hoặc sự kết hợp của các yếu tố này để nhận dạng sản phẩm hay dịch vụ và phân biệt chúng với đối thủ. Thương hiệu là tổng hợp các yếu tố vật chất, thẩm mỹ, lý lẽ và cảm xúc, bao gồm tên gọi, logo, liên tưởng, và biểu hiện liên quan, dần dần xây dựng trong tâm trí khách hàng để tạo dựng một chỗ đứng vững chắc (Richard Moore, 2003). Thương hiệu là tất cả những gì được biết đến, suy nghĩ tới, cảm giác và cảm nhận về một công ty, sản phẩm hoặc dịch vụ, bao gồm cả yếu tố hữu hình và vô hình (R.J.Gregory, 2011).

Tựu trung lại, thương hiệu được tiếp cận từ hai góc độ: Quan điểm truyền thống hiểu thương hiệu là tên hoặc biểu tượng; quan điểm tổng hợp cho rằng thương hiệu là tập hợp thuộc tính cung cấp giá trị cho khách hàng, đáp ứng cả nhu cầu chức năng và tâm lý. Sản phẩm chỉ đáp ứng nhu cầu chức năng, còn thương hiệu đáp ứng cả hai loại nhu cầu này. Dựa trên các nghiên cứu kinh điển, tham luận sử dụng định nghĩa theo quan điểm tổng hợp bởi phù hợp với mục tiêu nghiên cứu.

Trong lĩnh vực giáo dục, có một thực tế là nền giáo dục đại học đang phát triển mạnh mẽ, buộc các trường đại học, cao đẳng (ĐH, CĐ) phải cung cấp chất lượng giáo dục cao, xây dựng uy tín và tăng vị thế cạnh tranh. Điều này yêu cầu các trường phải hoạt động như doanh nghiệp và sử dụng chiến lược tiếp thị dài hạn. Thương hiệu của trường đại học là

tên, hình ảnh và giá trị cốt lõi, tạo dựng bản sắc riêng và được xã hội công nhận (Fredericks, V., J., and Parmley, K., , 2000). Thương hiệu trường gợi cảm xúc và ấn tượng và nhiệm vụ là phát triển những ấn tượng đó (Bulotaite, 2003). Xây dựng thương hiệu là chiến lược quan trọng của các CSGD (Chapleo, 2007).

Trước bối cảnh hội nhập quốc tế, Chính phủ Việt Nam đã cải cách cơ chế quản lý giáo dục, đặc biệt trong giáo dục ĐH, CĐ, trao quyền tự chủ tài chính và tự giải trình cho các CSGD. Điều này làm rõ vai trò của các trường ĐH, CĐ công lập như những đơn vị cung cấp dịch vụ giáo dục, với hoạt động tương tự như một doanh nghiệp (Nguyễn Viết Lâm, 2009).

2. GIÁ TRỊ THƯƠNG HIỆU

Trong khái niệm đầu tiên và chung chung về GTTH, (Aaker Jennifer L., 1997) định nghĩa GTTH là tập hợp các tài sản gắn liền với thương hiệu. GTTH phản ánh sự hiểu biết của người tiêu dùng, cùng với thái độ, cảm xúc, hành vi đối với thương hiệu thông qua kinh nghiệm của chính họ, để so sánh với các thương hiệu của đối thủ cạnh tranh. Các học giả khác cũng đã đưa ra định nghĩa tương tự và nhấn mạnh rằng hình ảnh và giá trị là mấu chốt trong việc xem xét thương hiệu (Keller, 2019).

Các mô hình đánh giá GTTH thường được phân thành hai nhóm: từ góc độ tài chính và từ quan điểm người tiêu dùng. Đánh giá GTTH từ góc độ tài chính giúp xác định tài sản của công ty, nhưng ít hỗ trợ các nhà quản trị trong việc phát triển và khai thác GTTH (Nguyễn Đình Thọ và Nguyễn Thị Mai Trang, 2011).

Để đo lường GTTH trong lĩnh vực dịch vụ giáo dục, tham luận này đi theo hướng thứ 2 là quan điểm của người tiêu dùng.

3. MÔ HÌNH NGHIÊN CỨU

Tham luận này dựa trên các học thuyết và công trình nghiên cứu liên quan. (Aaker Jennifer L., 1997) đưa ra mô hình GTTH gồm năm thành phần: nhận thức về thương hiệu, liên kết thương hiệu, chất lượng cảm nhận, lòng trung thành thương hiệu và các tài sản độc quyền khác. Nhiều nghiên cứu sau đó đã phát triển lý thuyết này.

Trong giáo dục đại học, (T. G. và C. B. M. Pinar, 2020) cho rằng nhận thức về thương hiệu cao giúp tăng ưu tiên lựa chọn dịch vụ, từ đó nâng cao GTTH. Việc xây dựng nhận biết thương hiệu không chỉ giúp nâng cao giá trị mà còn chuyển người tiêu dùng từ không nhận thức sang nhận thức về thương hiệu. Từ lập luận trên, giả thuyết được đề xuất như sau:

H1: Nhận biết thương hiệu có ảnh hưởng đến GTTH

Yếu tố thứ hai: Liên tưởng thương hiệu là tất cả những gì mà khách hàng "liên kết" trong bộ nhớ của mình với một thương hiệu cụ thể (Aaker Jennifer L., 1997). Các yếu tố như nhận dạng hình ảnh và lời nói, hành vi, văn hóa, tên thương hiệu, tuyên bố định vị và biểu tượng TH có vai trò quan trọng trong việc xây dựng liên tưởng TH cho các tổ chức giáo dục (Bosch et al. , 2006). Giả thuyết nghiên cứu được đưa ra như sau:

H2: Liên thưởng thương hiệu có ảnh hưởng đến GTTH

Yếu tố thứ ba: Hình ảnh thương hiệu của các trường đại học, dù công hay tư, là tài sản quý giá. Hình ảnh thương hiệu sẽ được tối ưu khi trường xây dựng mối quan hệ lâu dài giữa tổ chức và cộng đồng sinh viên (McAlexander et al., 2002). Một mô hình thương hiệu mạnh mẽ, dựa trên uy tín và danh tiếng, sẽ cải thiện hình ảnh thương hiệu (Sung, M., & Yang, S. U, 2008). Sinh viên đánh giá cao trường có chất lượng dịch vụ cao (Brown, R. M., & Mazzarol, T. W. , 2009). Từ đó, giả thuyết nghiên cứu được đưa ra như sau:

H3: Hình ảnh thương hiệu có ảnh hưởng đến GTTH

Yếu tố thứ tư: Lòng trung thành thương hiệu theo (Aaker Jennifer L., 1997) là mức độ gắn kết của người tiêu dùng với một thương hiệu. (Oliver, 1997) cho rằng lòng trung thành là cam kết bền vững trong việc tiếp tục sử dụng sản phẩm/dịch vụ ưa thích. Trong giáo dục, (Brown, R. M., & Mazzarol, T. W., 2009) chỉ ra rằng lòng trung thành giúp tăng GTTH. Giả thuyết nghiên cứu được đưa ra như sau:

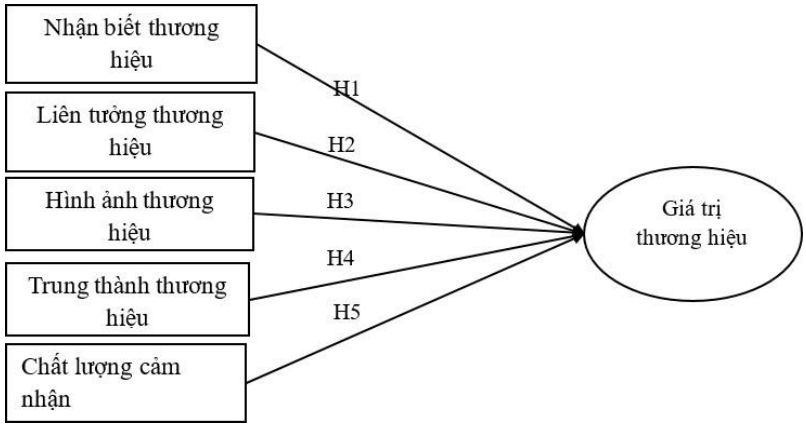
H4: Lòng trung thành với thương hiệu có ảnh hưởng đến GTTH

Yếu tố thứ năm: Chất lượng cảm nhận, theo (Aaker, D. A., 1991) là đánh giá của khách hàng về sự vượt trội của sản phẩm/dịch vụ so với các lựa chọn khác, dựa trên mục đích sử dụng và có thể khác với chất lượng thực sự. Trong giáo dục, nghiên cứu của (Pinar et al., 2014) cho thấy chất lượng cảm nhận không chỉ phụ thuộc vào sản phẩm mà còn từ quá

trình cung cấp dịch vụ, thái độ nhân viên và môi trường. Chất lượng cảm nhận cao sẽ dẫn đến GTTH lớn hơn. Giả thuyết như sau:

H5: Chất lượng cảm nhận có ảnh hưởng đến GTTH

Từ các giả thuyết nêu trên, mô hình nghiên cứu được đề xuất như Hình 1.



Hình 1. Mô hình nghiên cứu đề xuất

3. CÁC NHÂN TỐ ẢNH HƯỞNG ĐẾN GTTH KHOA Y (NAY LÀ TRƯỜNG ĐH KHSK)

Do dữ liệu được điều tra ở giai đoạn 2020-2024, thời điểm Trường ĐH KHSK còn tên gọi là Khoa Y ĐHQG-HCM. Chính vì vậy, trong bảng khảo sát và các tài liệu liên quan, tác giả đã sử dụng tên gọi "Khoa Y ĐHQG-HCM" để đảm bảo sự nhất quán với thời kỳ khảo sát. Tác giả sử dụng bảng hỏi để khảo sát 200 sinh viên, cựu sinh viên, học viên, thầy cô theo thang đo Likert 5 mức độ từ 1 (hoàn toàn không đồng ý) đến 5 (hoàn toàn đồng ý) để đo lường các nhân tố và mức độ ảnh hưởng của các nhân tố đến GTTH Khoa Y. Sau khi làm sạch và sàng lọc dữ liệu, tác giả loại bỏ 50 phản hồi không nhất quán và giữ lại 150 phiếu hợp lệ để phân tích.

Về giới tính: Trong 150 phiếu trả lời hợp lệ, Số lượng nữ nhiều hơn nam. Nam 56 người (chiếm 37,3%), nữ 94 người (chiếm 62,7%).

Về mối quan hệ với trường: Người tham gia khảo sát đa số là sinh viên chiếm tỷ lệ 70% và các đối tượng khác là 30%. Cụ thể, sinh viên năm 1 chiếm 21,3% (32 người), sinh viên năm 2 chiếm 5,3% (8 người), sinh viên năm 3 chiếm 1,3% (2 người), sinh viên năm 4 chiếm 12,7% (19 người), sinh viên năm 5 chiếm 5,3% (8 người), sinh viên năm 6 chiếm 24,0% (36 người), Cựu sinh viên chiếm 11,3 % (17 người), Học viên cao học chiếm 9,3% (14 người) và Thầy cô chiếm 9,3% (14 người)

Hệ số tin cậy Cronbach's Alpha của các thang đo trong nghiên cứu đều nằm trong phạm vi chấp nhận được (0,6 < Cronbach's Alpha < 1), và hệ số tương quan giữa từng biến với tổng điểm của các biến quan sát trong mỗi thang đo đều lớn hơn 0,3. Do đó, các biến quan sát này đáp ứng yêu cầu về độ tin cậy.

Bảng 1. Tổng hợp kết quả kiểm định độ tin cậy thang đo

Kí hiệu	Trung bình thang đo nếu loại biến	Phương sai thang đo nếu loại biến	Tương quan biến - tổng	Cronbach's Alpha nếu loại biến	Kết luận
Thang đo "Nhận biết thương hiệu": Cronbach's Alpha = 0,703					
NBTH1. Tôi dễ dàng nhận ra những biểu tượng, hình ảnh đặc trưng của Khoa Y	14,85	6,533	0,500	0,639	Biến phù hợp
NBTH2. Khoa Y được nhiều người biết và nhắc đến	15,51	5,795	0,561	0,607	Biến phù hợp
NBTH3. Tôi đã nghe rất nhiều điều tốt về Khoa Y	15,17	6,252	0,539	0,621	Biến phù hợp
NBTH4. Tôi có thể nhận ra Khoa Y trong số các CSGDĐH khác ở TP.HCM	15,00	6,725	0,361	0,695	Biến phù hợp

NBTH5. Tôi biết tất cả các dịch vụ được cung cấp bởi Khoa Y	15,21	6,890	0,349	0,698	Biến phù hợp
Thang đo "Liên tưởng thương hiệu": Cronbach's Alpha = 0,622					
LTTH1. Khoa Y có danh tiếng trong lĩnh vực bạn đang theo học tại TP.HCM	11,51	3,554	0,309	0,614	Biến phù hợp
LTTH2. Logo của Khoa Y gây chú ý	11,63	2,865	0,512	0,466	Biến phù hợp
LTTH3. Khoa Y có mức học phí phù hợp	11,68	3,199	0,339	0,601	Biến phù hợp
LTTH4. Khoa Y có chương trình truyền thông phù hợp	11,61	3,058	0,457	0,511	Biến phù hợp
Thang đo "Hình ảnh thương hiệu": Cronbach's Alpha = 0,815					
HATH1. Khoa Y là một trường CSGD có uy tín	11,68	3,427	0,657	0,757	Biến phù hợp
HATH2. Khoa Y có một hình ảnh tốt trong tâm trí của sinh viên	11,89	3,282	0,688	0,742	Biến phù hợp
HATH3. Khoa Y có nhiều đóng góp cho xã hội	11,69	3,342	0,616	0,775	Biến phù hợp
HATH4. Khoa Y có một hình ảnh tốt hơn so với các đối thủ cạnh tranh	12,02	3,375	0,581	0,793	Biến phù hợp
Thang đo "Sự trung thành thương hiệu": Cronbach's Alpha = 0,852					
TTTH1. Tôi tự hào khi người khác biết rằng tôi học/ tốt nghiệp từ Khoa Y	11,95	5,347	0,637	0,836	Biến phù hợp
TTTH2. Tôi luôn nói tốt với người khác về Khoa Y	11,95	4,958	0,717	0,804	Biến phù hợp
TTTH3. Khi những người khác muốn theo học ngành giống như tôi, tôi sẽ khuyên họ theo học tại Khoa Y	12,10	4,466	0,760	0,782	Biến phù hợp
TTTH4. Nếu được lựa chọn lại trường để theo học, tôi vẫn chọn Khoa Y	12,19	4,076	0,697	0,821	Biến phù hợp
Thang đo "Chất lượng cảm nhận": Cronbach's Alpha = 0,896					
CLCN1. Các phòng ban cư xử với tôi rất thân thiện, lịch sự	24,22	14,388	0,623	0,890	Biến phù hợp
CLCN2. Giảng viên tận tình, gần gũi, phương pháp giảng dạy hiệu quả	23,95	14,292	0,713	0,879	Biến phù hợp
CLCN3. Nội dung chương trình tiên tiến, luôn được cập nhật, đổi mới	24,02	13,765	0,725	0,877	Biến phù hợp
CLCN4. Các khóa học đáp ứng tốt mong đợi của tôi (kiến thức và kỹ năng)	24,16	13,692	0,781	0,871	Biến phù hợp
CLCN5. Có thể học liên thông sau ĐH, hoặc học liên kết với các trường khác	24,16	14,525	0,680	0,883	Biến phù hợp
CLCN6. Nhiều hoạt động ngoại khóa, hội thảo, chuyên đề bổ ích	24,22	14,428	0,615	0,891	Biến phù hợp
CLCN7. Một cách tổng quát, tôi hài lòng về chất lượng đào tạo của nhà trường	24,11	14,356	0,766	0,874	Biến phù hợp
Thang đo "Giá trị thương hiệu": Cronbach's Alpha = 0,827					
GTTH1. Xã hội đánh giá rất tích cực những	7,71	1,897	0,681	0,764	Biến phù

người tốt nghiệp từ Khoa Y					hợp
GTTH2. Khả năng kiếm việc làm phù hợp sau khi tốt nghiệp tại Khoa Y là rất cao	7,78	1,797	0,688	0,755	Biến phù hợp
GTTH3. Dù các trường khác cũng tốt như Khoa Y, tôi thích sử dụng dịch vụ của Khoa Y hơn	7,81	1,790	0,682	0,763	Biến phù hợp

(Nguồn: Kết quả phân tích của tác giả, 2024)

Sau khi đánh giá độ tin cậy của thang đo, 24 biến quan sát của các nhân tố độc lập và 03 biến quan sát của nhân tố phụ thuộc (GTTH) được tiến hành phân tích nhân tố khám phá (EFA). Phân tích EFA lần 1, tác giả loại bỏ biến LTTH1 do có trọng số nhân tố < 0,5 và phân tích EFA lần 2, kết quả cho thấy, tất cả các biến quan sát của nhân tố độc lập và nhân tố phụ thuộc đều có trọng số nhân tố > 0,5 nên đều thỏa điều kiện. Kết quả phân tích được trình bày ở Bảng 2 và Bảng 3.

Bảng 2. Tóm tắt kết quả phân tích nhân tố khám phá biến độc lập

Biến quan sát	**Hệ số nhân tố tải**				
	1	**2**	**3**	**4**	**5**
CLCN2	0,775				
Biến quan sát	**Hệ số nhân tố tải**				
	1	**2**	**3**	**4**	**5**
CLCN4	0,773				
CLCN3	0,766				
CLCN5	0,709				
CLCN7	0,674				
CLCN1	0,627				
CLCN6	0,591				
TTTH3		0,760			
TTTH4		0,722			
TTTH2		0,715			
TTTH1		0,693			
NBTH2			0,745		
NBTH5			0,618		
NBTH1			0,613		
NBTH3			0,613		
NBTH4			0,590		
HATH1				0,752	
HATH2				0,604	
HATH3				0,580	
HATH4				0,514	
LTTH2					0,771
LTTH3					0,684
LTTH4					0,538
Hệ số Eigenvalues	8,874	1,930	1,420	1,165	1,047
Phương sai trích %	38,583	8,391	6,173	5,067	4,553
Phương sai tích lũy %	38,583	46,974	53,147	58,214	62,767
Hệ số KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy)				0,898	
Hệ số Sig. (Bartlett's Test of Sphericity)				0,000	

Bảng 3. Tóm tắt kết quả phân tích nhân tố khám phá biến phụ thuộc

Biến quan sát	Hệ số nhân tố tải
	1
GTTH1	0,860
GTTH2	0,865
GTTH3	0,861
Hệ số Eigenvalues	2,228
Phương sai trích %	74,279
Hệ số KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy)	0,723
Hệ số Sig. (Bartlett's Test of Sphericity)	0,000

Kết quả kiểm định Bartlett's Test cho thấy mức ý nghĩa thống kê (Sig.) là 0,000 < 0,05, chứng tỏ các biến quan sát có tương quan tuyến tính với nhau trong tổng thể. Tất cả các biến quan sát có trọng số nhân tố > 0,5 nên phù hợp với giả thuyết ban đầu, đảm bảo độ tin cậy và có giá trị để phân tích hồi quy. Hệ số phóng đại phương sai (VIF) từ 1,357 đến 2,262, không vượt quá 10, và độ chấp nhận biến lớn hơn 0,2 không có dấu hiệu đa cộng tuyến, cho thấy mô hình hồi quy đạt yêu cầu.

Bảng 4. Thống kê phân tích các hệ số hồi quy

Mô hình	Hệ số chuẩn hóa	t	Mức ý nghĩa	Thống kê đa cộng tuyến	
	Beta			Độ chấp nhận biến	VIF
NBTH	0,227	4,238	0,000	0,737	1,357
LTTH	0,116	2,072	0,040	0,671	1,490
HATH	0,372	5,579	0,000	0,475	2,106
TTTH	0,177	2,558	0,012	0,442	2,262
CLCN	0,173	2,557	0,012	0,464	2,155

Kết quả phân tích hồi quy cho thấy 5 biến độc lập (NBTH, LTTH, HATH, TTTH, CLCN) đều có tác động tích cực đến biến phụ thuộc GTTH với hệ số hồi quy chuẩn hóa dương và có ý nghĩa thống kê (Sig. < 0,05). Mức độ tác động của các biến vào GTTH: Hình ảnh thương hiệu (HATH) là mạnh nhất (β3 = 0,372), tiếp theo là Nhận biết thương hiệu (NBTH) (β1 = 0,227), Sự trung thành thương hiệu (TTTH) (β4 = 0,177), Chất lượng cảm nhận (CLCN) (β5 = 0,173), và Liên tưởng thương hiệu (LTTH) (β2 = 0,116). Do nhân tố "hình ảnh thương hiệu" có ảnh hưởng lớn nhất đến GTTH, do đó, tác giả phân tích về giá trị trung bình và độ lệch chuẩn của nhân tố này và bỏ qua phần trình bày đối với các nhân tố khác tại tham luận. Kết quả thể hiện ở Bảng 5.

Bảng 5. Giá trị trung bình và độ lệch chuẩn của nhân tố Hình ảnh thương hiệu

Mã hóa	Thang đo	Giá trị trung bình	Độ lệch chuẩn
HATH1	Khoa Y là một CSGD ĐH có uy tín	4.08	0.700
HATH2	Khoa Y có một hình ảnh tốt trong tâm trí của sinh viên	3.87	0.726
HATH3	Khoa Y có nhiều đóng góp cho xã hội	4.07	0.757
HATH4	Khoa Y có một hình ảnh tốt hơn so với các đối thủ cạnh tranh	3.74	0.772

Câu trả lời "Khoa Y có một hình ảnh tốt trong tâm trí của sinh viên" có giá trị trung bình là 3.87 và tỉ lệ câu trả lời được chọn "Trung lập" là 55%, chứng tỏ sinh viên chưa thực sự hài lòng. Hình ảnh của Khoa Y ĐHQG-HCM đã được cải thiện trong giai đoạn 2020-2024: có cơ sở vật chất riêng, đó là tòa hành chính Y.A1 tại khu quy hoạch Trường ĐH KHSK – Bệnh viện ĐHQG-HCM. Tuy nhiên, tòa Y.A1 chủ yếu là khối nhà cho các bộ phận hành chính, ít phòng học. Sinh viên vẫn phải học tại nhiều cơ sở dùng chung của ĐHQG-HCM, dẫn đến mất thời gian di chuyển… từ đó ảnh hưởng không tốt đến hình ảnh của trường trong tâm trí của sinh viên. Việc đầu tư xây dựng cơ sở vật chất còn phụ thuộc nhiều yếu tố khách quan, yếu tố về cơ chế - chính sách để có thể hoàn thành một dự án đầu tư xây dựng. Câu trả lời "Khoa Y là một CSGD ĐH có uy tín" và "Khoa Y có nhiều đóng góp cho xã hội" có giá trị trung bình khá cao lần lượt là 4.08 và 4.07, đồng thời tỉ lệ trả lời "Đồng ý" và "Hoàn toàn đồng ý" cho cả hai câu đều trên 50%. Thực tế, Khoa Y đã thiết lập được mối quan hệ trường - viện với hầu hết các bệnh viện lớn, có uy tín tại Tp.HCM. Cơ sở thực hành đặt tại 08 bệnh viện đa khoa và chuyên khoa từ hạng 1 của trung ương và TP.HCM; thiết lập quan hệ với 52 đối tác trong nước và 27 đối

tác quốc tế, triển khai 04 dự án quốc tế. Số lượng đề tài nghiên cứu cấp ĐHQG-HCM và tỉ lệ bài báo/giảng viên tăng qua từng năm. Bên cạnh đó, Khoa Y đã và đang liên kết với các trường đại học danh tiếng trên thế giới để liên kết đào tạo chương trình chuyển tiếp tín chỉ. Sinh viên có cơ hội lựa chọn học 3 năm cuối tại Đại học Otago theo chương trình chuyển tiếp tín chỉ 2 + 3 giữa Khoa Y với ĐH Otago.

Khoa Y cũng là một trong số ít các trường được Bộ Y tế cấp mã đào tạo liên tục (CME), được Bộ Y tế và Bộ Giáo dục - Đào tạo giao nhiệm vụ đào tạo bác sĩ theo diện đặt hàng cho vùng Tây Nam Bộ và các vùng kinh tế trọng điểm. Công tác đổi mới chương trình và phương pháp giảng dạy luôn được chú trọng và đang được thực hiện thông qua Dự án IMPACT-MED theo tài trợ của Cơ quan Phát triển Quốc tế Hoa Kỳ (USAID). Khoa Y cũng đã thành lập Hội đồng Khoa học và Đào tạo để tham mưu về các vấn đề liên quan đến đào tạo và nghiên cứu khoa học; thành lập Hội đồng đạo đức trong nghiên cứu y sinh nhằm bảo đảm các nguyên tắc, chuẩn mực đạo đức trong các nghiên cứu y sinh học. Bên cạnh việc cung cấp nguồn nhân lực y tế có chất lượng, Khoa Y luôn thực hiện trách nhiệm xã hội với rất nhiều chương trình thường niên như: Tiếp sức mùa thi; Mùa hè xanh; Xuân tình nguyện, Hiến máu tình nguyện Warm Blood… để thầy cô, sinh viên cùng lan tỏa sứ mệnh của người thầy thuốc phụng sự cộng đồng bằng cả chuyên môn và trái tim. Khoa Y hiện tại có nhiều đóng góp cho xã hội, cộng đồng nên hình ảnh đã dần được cải thiện, tuy nhiên vẫn còn một số thực trạng như cơ sở vật chất chưa hoàn thiện phần nào làm ảnh hưởng đến hình ảnh của Khoa Y trong tâm trí của sinh viên.

KẾT LUẬN VÀ HÀM Ý QUẢN TRỊ

Khoa Y nay là Trường ĐH KHSK đặt ra một tầm nhìn phát triển rõ ràng cho giai đoạn 2025-2030 và định hướng đến năm 2045 trở thành cơ sở GDĐH tiên tiến, uy tín trong khu vực. Để nâng cao GTTH, Nhà trường có thể thực hiện các giải pháp:

– *Tăng cường hình ảnh thương hiệu*: Cải thiện cơ sở vật chất, môi trường học tập hiện đại, ứng dụng công nghệ thông tin vào quản lý và đào tạo. Áp dụng đồng bộ hệ thống nhận diện thương hiệu. Tăng cường các chương trình hợp tác quốc tế, trao đổi sinh viên và giảng viên, tạo cơ hội giao lưu học thuật.

– *Nâng cao nhận biết về thương hiệu:* Tổ chức các sự kiện, hội thảo, hội nghị khoa học để nâng cao uy tín và vị thế Nhà trường. Đẩy mạnh tiếp thị kỹ thuật số (quảng cáo từ khóa, tối ưu hóa (SEO) website, E-mail marketing…) tiếp cận đa dạng đối tượng mục tiêu. Mở rộng quan hệ với các tập đoàn, doanh nghiệp trong lĩnh vực y tế, tạo kết nối và nâng cao thương hiệu.

– *Xây dựng sự trung thành thương hiệu*: Tiếp tục nâng cao chất lượng đào tạo, hỗ trợ sinh viên tham gia các giải thưởng văn hóa, học thuật uy tín để họ cảm thấy tự hào về trường. Xây dựng cộng đồng cựu sinh viên mạnh mẽ, tạo các chương trình hỗ trợ nghề nghiệp cho sinh viên sau khi ra trường.

– *Cải thiện chất lượng cảm nhận*: Đảm bảo chất lượng giảng dạy. Tổ chức các khóa đào tạo chuyên sâu, các hoạt động ngoại khóa nhằm phát triển toàn diện sinh viên. Đánh giá và cải tiến liên tục chương trình đào tạo, đảm bảo đáp ứng nhu cầu thực tế của ngành y tế.

– *Tăng cường liên tưởng thương hiệu*: Nghiên cứu chính sách như giảm học phí cho cựu sinh viên học sau đại học, nâng cao chất lượng quan hệ doanh nghiệp, thu hút nguồn tài trợ, học bổng và chú trọng sức khỏe thể chất, tinh thần của sinh viên.

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CHUYỂN ĐỔI SỐ TRONG QUẢN TRỊ ĐẠI HỌC

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TÓM TẮT

Chuyển đổi số trong quản trị đại học là xu thế tất yếu trong bối cảnh cách mạng công nghiệp 4.0. Sự phát triển mạnh mẽ của công nghệ yêu cầu các trường đại học phải xây dựng mô hình và phương pháp quản trị hiệu quả trên nhiều lĩnh vực, bao gồm quản lý đào tạo, quản lý khoa học, quản trị nguồn nhân lực và quản trị hành chính văn phòng... Để đảm bảo sự phát triển bền vững, các trường đại học cần có chính sách phù hợp, chuẩn bị nguồn lực và triển khai các giải pháp hiệu quả. Chuyển đổi số chính là giải pháp thiết yếu và hiệu quả để hệ thống giáo dục đại học chuyển sang nền công nghệ giáo dục số, tạo nền tảng cho quản trị bền vững. Mục tiêu của nghiên cứu này là đánh giá vai trò và tác động của chuyển đổi số trong lĩnh vực hành chính văn phòng đối với quản trị đại học và phát triển bền vững. Phân tích thực trạng triển khai chuyển đổi số, đánh giá lợi ích và kết quả chuyển đổi số trong lĩnh vực hành chính văn phòng đem lại trong quản trị đại học, và đề xuất giải pháp quản trị phù hợp để đáp ứng yêu cầu phát triển bền vững.

Từ khóa: chuyển đổi số, quản trị đại học, hành chính văn phòng, phát triển bền vững

Key words: digital transformation, university administration, office administration, sustainable development

1. ĐẶT VẤN ĐỀ

Trước sự tác động của những thành tựu và ứng dụng công nghệ hiện đại, chuyển đổi số đã trở thành nhu cầu thiết yếu để xây dựng một nền tảng công nghệ giáo dục hiện đại. Các trường đại học trên thế giới và trong khu vực đang tích cực đẩy mạnh hoạt động chuyển đổi số nhằm đảm bảo sự đa dạng hóa trong hoạt động dạy học, tăng cường tính trải nghiệm, và tạo sự hấp dẫn đối với người học. Đồng thời, điều này cũng giúp nâng cao chất lượng quản lý đào tạo, cải thiện hiệu quả trong việc truyền đạt thông tin và quản trị. Chuyển đổi số trong quản trị đại học tập trung vào việc xây dựng mô hình quản trị, triển khai các ứng dụng công nghệ trong quản lý và truyền thông, điều hành các hoạt động, cũng như đánh giá kết quả hoạt động của các đơn vị, bộ phận và từng thành viên trong nhà trường dựa trên nền tảng số. Đây chính là một trong những cơ sở nền tảng để hình thành một trường học thông minh.

2. BỐI CẢNH, YÊU CẦU CHUYỂN ĐỔI SỐ TRONG QUẢN TRỊ ĐẠI HỌC

Trong bối cảnh cách mạng công nghiệp 4.0, chuyển đổi số trong quản trị đại học trở thành một yêu cầu cấp bách và thiết yếu. Sự phát triển nhanh chóng của công nghệ thông tin và truyền thông đã tác động mạnh mẽ đến mọi lĩnh vực, bao gồm cả giáo dục. Các trường đại học không chỉ cần cải thiện chất lượng giảng dạy và học tập mà còn phải nâng cao hiệu quả trong quản lý điều hành nói chung và trong các lĩnh vực hỗ trợ như tài chính, nguồn nhân lực và hành chính văn phòng.

Yêu cầu chuyển đổi số trong quản trị đại học bao gồm việc áp dụng các công nghệ tiên tiến để tự động hóa quy trình làm việc, tối ưu hóa việc quản lý và sử dụng dữ liệu và thông tin số. Điều này không chỉ giúp tiết kiệm thời gian và chi phí mà còn nâng cao tính chính xác và minh bạch trong các hoạt động quản trị. Ngoài ra, việc chuyển đổi số còn tạo cơ hội để các trường đại học phát triển các mô hình học tập linh hoạt, tương tác và cá nhân hóa, từ đó đáp ứng tốt hơn nhu cầu của người học trong thời đại số.

Để thực hiện hiệu quả quá trình chuyển đổi này, các trường đại học cần xây dựng chiến lược rõ ràng, đầu tư vào cơ sở hạ tầng công nghệ và đào tạo nhân lực, đồng thời tạo ra một văn hóa đổi mới sáng tạo trong toàn bộ tổ chức.

2. CÁC KHÁI NIỆM LIÊN QUAN

Chuyển đổi số (Digital transformation)

Ngày 03 tháng 6 năm 2020, Thủ tướng Chính phủ đã ký ban hành Quyết định số 749/QĐ-TTg về việc phê duyệt Chương trình Chuyển đổi số quốc gia đến năm 2025, định hướng đến năm 2030. Đồng thời, cũng trong năm 2020, Bộ Thông tin và Truyền thông đã ban hành "Cẩm nang Chuyển đổi số". Theo đó, "Chuyển đổi số được hiểu là quá trình thay

đổi tổng thể và toàn diện của các nhân, tổ chức về cách sống, cách làm việc và phương thức sản xuất dựa trên các công nghệ số". Chuyển đổi số là bước phát triển tiếp theo của tin học hóa, số hóa, có được nhờ sự tiến bộ vượt bậc của những công nghệ mới mang tính đột phá, nhất là công nghệ số.

Theo FPT (2024) một trong những doanh nghiệp hàng đầu, tiên phong về lĩnh vực công nghệ và chuyển đổi số ở Việt Nam "chuyển đổi số trong tổ chức, doanh nghiệp là quá trình thay đổi từ mô hình truyền thống sang doanh nghiệp số bằng cách áp dụng công nghệ mới như dữ liệu lớn (Big Data), Internet vạn vật (IoT), điện toán đám mây (Cloud)… thay đổi phương thức điều hành, lãnh đạo, quy trinh làm việc, văn hóa công ty". Đặc điểm của chuyển đổi số là dựa trên nền tảng công nghệ. Trong quá trình này, tổ chức/doanh nghiệp sẽ áp dụng công nghệ số như trí tuệ nhân tạo (AI), blockchain, học máy, IoT (Internet of Things), big data, cloud computing… để tối ưu hóa quy trình làm việc, tăng cường hiệu suất và khả năng sáng tạo, cũng như cung cấp trải nghiệm tốt hơn cho khách hàng và nhân viên.

Như vậy, chuyển đổi số là quá trình tích hợp công nghệ số vào tất cả các lĩnh vực của một tổ chức, dẫn đến sự thay đổi căn bản trong cách thức hoạt động, cách cung cấp giá trị cho khách hàng và cách tương tác với các bên liên quan. Điều này không chỉ đơn thuần là việc áp dụng công nghệ, mà còn bao gồm sự thay đổi trong văn hóa tổ chức, quy trình và mô hình kinh doanh.

Như vậy, các đặc trưng cơ bản của chuyển số gồm: Áp dụng công nghệ kỹ thuật số (dữ liệu số, phương tiện kỹ thuật số); thay đổi quy trình, phương thức và mô hình hoạt động; Sử dụng các giải pháp công nghệ hiệu quả và sáng tạo, đổi mới thay cho phương pháp truyền thống. Chuyển đổi số mang lại nhiều lợi ích như: nâng cao hiệu quả hoạt động, cải thiện trải nghiệm khách hàng, tăng cường khả năng cạnh tranh, tạo ra cơ hội kinh doanh mới và phát triển văn hóa đổi mới sáng tạo.

Quản trị đại học là một vấn đề thu hút sự quan tâm của nhiều nhà nghiên cứu, nhà quản lý giáo dục. Trên thế giới có nhiều nghiên cứu học thuật về quản trị đại học theo cách tiếp cận từ mô hình truyền thống đến mô hình hiện đại trong đó tập trung vào hiệu quả hoạt động của các mô hình. Quản trị đại học là cách thức mà các cơ sở giáo dục đại học được tổ chức và quản lý thông qua các cơ chế, chính sách để đưa ra các quyết định điều hành, xây dựng và phát triển trường đại học (Nhàn & Anh, 2022).

Quản trị đại học là quá trình lập kế hoạch, tổ chức, điều hành và kiểm soát các hoạt động của một cơ sở giáo dục đại học nhằm đạt được các mục tiêu giáo dục và nghiên cứu đã đề ra. Quản trị đại học không chỉ bao gồm việc quản lý các nguồn lực như con người, tài chính và cơ sở vật chất, mà còn liên quan đến việc phát triển các chính sách, quy trình và hệ thống để đảm bảo hiệu quả trong hoạt động giảng dạy, học tập và nghiên cứu khoa học. Mục đích của quản trị đại học là khai thác một cách hiệu quả các nguồn lực tài nguyên của nhà trường, phân định rõ trách nhiệm, quyền hạn và kiểm soát hoạt động để hoàn thành các mục tiêu, sứ mệnh của nhà trường. Mục tiêu cuối cùng của quản trị đại học là nâng cao chất lượng giáo dục, đáp ứng nhu cầu xã hội và phát triển bền vững của cơ sở giáo dục.

Khái niệm phát triển bền vững

Phát triển bền vững là sự phát triển đáp ứng nhu cầu hiện tại mà không làm tổn hại đến khả năng của các thế hệ tương lai, nhấn mạnh sự cân bằng giữa kinh tế, xã hội và môi trường. Trong bối cảnh quản trị đại học, khái niệm này liên quan đến việc tích hợp các nguyên tắc bền vững vào giáo dục, nghiên cứu và quản lý, nhằm tạo ra môi trường học tập thân thiện với môi trường và góp phần phát triển bền vững cho cộng đồng.

Các yếu tố chính của phát triển bền vững trong trường đại học bao gồm: 1) Chính sách giáo dục và quản trị: Xây dựng chính sách tích hợp tiêu chí bền vững vào chương trình giảng dạy và hoạt động quản lý. 2) Đầu tư vào công nghệ và cơ sở hạ tầng: Áp dụng công nghệ hiện đại và phát triển cơ sở hạ tầng bền vững như năng lượng tái tạo. 3) Nghiên cứu và đổi mới sáng tạo: Khuyến khích nghiên cứu và phát triển các giải pháp bền vững. 4) Hợp tác với cộng đồng: Thiết lập mối quan hệ hợp tác với các tổ chức, doanh nghiệp và cộng đồng. 5) Đào tạo nguồn nhân lực: Phát triển nhân lực chất lượng cao. 6) Tham gia cộng đồng: Tích cực tham gia các hoạt động phục vụ xã hội, nâng cao trách nhiệm cộng đồng.

Phát triển bền vững không chỉ nâng cao chất lượng giáo dục mà còn hình thành công dân có trách nhiệm, đáp ứng các thách thức toàn cầu, đồng thời cải thiện uy tín và hình ảnh của trường.

Hành chính văn phòng (Office Administration) là tập hợp các hoạt động và quy trình quản lý nhằm hỗ trợ và duy trì hoạt động hiệu quả của một tổ chức. Nó bao gồm việc tổ chức, điều phối và quản lý các công việc hành chính cần thiết

cho sự vận hành hàng ngày của văn phòng, chẳng hạn như quản lý thông tin, tài liệu, chuẩn hóa quy trình làm việc, hỗ trợ công tác điều hành của nhà lãnh đạo (xây dựng kế hoạch làm việc, tổ chức thực thi các kế hoạch, quyết định của lãnh đạo), quản lý các nguồn lực của văn phòng như: nguồn nhân lực, cơ sở vật chất, phương tiện làm việc và quản lý các hoạt động liên quan đến giao tiếp (lễ tân, hội họp), nhằm đảm bảo hoạt động của tổ chức diễn ra suôn sẻ và hiệu quả.

Vai trò của hành chính văn phòng trong tổ chức: Hành chính văn phòng đảm bảo rằng các quy trình và hoạt động hàng ngày diễn ra một cách trơn tru, từ việc quản lý lịch làm việc đến tổ chức các cuộc họp và sự kiện; Quản lý thông tin và tài liệu một cách hiệu quả; Đảm bảo giao tiếp nội bộ và bên ngoài; Hỗ trợ ra quyết định của nhà lãnh đạo, quản lý; Tối ưu hóa quy trình làm việc; Quản lý tài chính và ngân sách.

Hành chính văn phòng đóng vai trò thiết yếu trong việc duy trì hoạt động hiệu quả của tổ chức. Nó không chỉ hỗ trợ các quy trình nội bộ mà còn ảnh hưởng đến cách tổ chức tương tác với khách hàng và các bên liên quan, góp phần vào sự phát triển bền vững của tổ chức.

3. THỰC TRẠNG CHUYỂN ĐỔI SỐ TRONG LĨNH VỰC HÀNH CHÍNH VĂN PHÒNG VÀ TÁC ĐỘNG CỦA NÓ ĐỐI VỚI QUẢN TRỊ ĐẠI HỌC Ở VIỆT NAM

3.1. Chuyển đổi số trong quản trị đại học trên thế giới

Trên thế giới, chuyển đổi số đã trở thành một xu hướng không thể thiếu, và là ưu tiên hàng đầu của các cơ sở giáo dục đại học trong việc đào tạo nguồn nhân lực chất lượng cao cũng như nghiên cứu phục vụ cho quá trình này. Theo nghiên cứu của Castro Benavides và các cộng sự (2020), để một trường đại học có thể tồn tại và phát triển trong bối cảnh chuyển đổi số, việc số hóa toàn diện là rất cần thiết. Điều này giúp khai thác hiệu quả các cơ hội và tiềm năng mà công nghệ kỹ thuật số mang lại, đồng thời tái định hình các mô hình hoạt động trên toàn bộ chuỗi giá trị. Đây không chỉ là một cơ hội mà còn là một nhiệm vụ đầy thách thức cho các trường đại học, nhất là trong bối cảnh cạnh tranh ngày càng gay gắt trên thị trường giáo dục toàn cầu trong xu hướng "thế giới phẳng".

Hiện nay, các trường đại học đang chú trọng vào việc chuyển đổi số kết hợp với tích hợp hệ thống thông tin thông qua việc sử dụng các phần mềm hỗ trợ quản lý. Đặc biệt, việc áp dụng công nghệ điện toán đám mây (SMAC), trí tuệ nhân tạo (AI) và machine learning (ML) đã giúp chia sẻ dữ liệu, nâng cao hiệu quả hoạt động của hệ thống quản lý. Điều này không chỉ cải thiện khả năng tương tác mà còn đơn giản hóa quá trình tích hợp kỹ thuật số. Tại Mỹ, Đại học Brown xem chuyển đổi số như một cách tạo ra một hệ sinh thái kỹ thuật số, nhằm tối ưu hóa quản lý quy trình và nâng cao hiệu suất toàn trường, đồng thời thúc đẩy việc sử dụng dữ liệu và thông tin có sẵn trong quá trình ra quyết định. Hệ sinh thái kỹ thuật số của Đại học Brown hỗ trợ mạnh mẽ cho sứ mệnh phát triển của trường, giúp giải quyết các mục tiêu chiến lược đã đề ra. Một số các trường đại học khác ở Mỹ như Đại học Bang North California, Đại học Bang Texas, MIT, Illionois cũng tiến hành chuyển đổi mô hình đại học hoạt động theo mô hình doanh nghiệp gắn với chuyển đổi số.

Tại Mexico, Học viện Công nghệ và Giáo dục Đại học Monterey đã tiến hành chuyển đổi số với việc ứng dụng những công nghệ hiện đại vào trong hoạt động của trường. Trong thời gian đăng ký tuyển sinh đại học trường thường xuyên nhận hơn 14.000 phản hồi từ sinh viên, để trả lời các câu hỏi này đòi hỏi một nhóm 10 người xử lý và hỗ trợ. Để giải quyết vấn đề này, trường đã triển khai các chatbot kết nối với hệ thống thông tin sinh viên và hệ thống tài chính, cung cấp phản hồi tức thì dựa trên danh tính kỹ thuật số của sinh viên. Trợ lý ảo này có thể được truy cập qua cổng thông tin dành cho sinh viên, với dữ liệu được trích xuất từ nhiều hệ thống khác nhau nhằm tạo ra những phản hồi cá nhân hóa. Trong quá trình lựa chọn công cụ để xây dựng chatbot, trường đã xem xét nhiều tùy chọn và quyết định sử dụng nền tảng Microsoft Azure AI, một hệ sinh thái "end-to-end" cho phép tích hợp các chiến lược về cơ sở hạ tầng, dữ liệu và dịch vụ AI. Nhờ vào việc áp dụng công nghệ số, trường không chỉ nâng cao chất lượng dịch vụ mà còn cải thiện các hoạt động đào tạo và học tập của sinh viên.

Chiến lược chuyển đổi số của các trường đại học ở Vương quốc Anh có kết cấu dựa trên bốn nội dung chính về: *1) Lãnh đạo:* thái độ cởi mở của người lãnh đạo với bối cảnh chuyển đổi số; yêu cầu, đòi hỏi về sự phát triển chuyên nghiệp hơn trên nền tảng kỹ thuật số; khả năng định hình tư duy chiến lược về chuyển đổi số của họ khi tham gia vào hội đồng quản trị; trách nhiệm giải trình rõ ràng, minh bạch đối với chiến lược chuyển đổi số như một thành viên của nhóm điều hành quản trị đại học cấp cao… (Hesse, Kobsda & Leiser, 2021); *2) Giảng viên/Nhân viên:* đòi hỏi ở họ các kỹ năng và sự sáng tạo cần thiết trong chiến lược chuyển đổi số. Sự thành công của các thành phần kỹ thuật số trong chiến lược chuyển đổi số dài hạn của bất cứ trường đại học nào cũng đều phụ thuộc phần lớn vào sự sẵn sàng và khả năng thực

hiện nó của giảng viên và nhân viên trong nhà trường; *3) Mô hình kinh doanh giáo dục đại học:* Chiến lược chuyển đổi số giúp: tạo ra nhiều cơ hội để thu hút các sinh viên đến từ nhiều thành phần xã hội khác nhau; tạo ra sự lựa chọn chính xác hơn về tiến độ và địa điểm học tập cho sinh viên; cải thiện tính bền vững tài chính cho nhà trường bằng cách mở ra các dòng doanh thu mới; hợp tác rộng rãi hơn với các nhà tuyển dụng; và đáp ứng tốt hơn mọi kỳ vọng của sinh viên tốt nghiệp, phụ huynh và các nhà hoạch định chính sách (Iosad, 2020); *4) Đầu tư:* chiến lược chuyển đổi số đòi hỏi phải đánh giá chính xác các khoản đầu tư cần thiết để thực hiện các mục tiêu của chiến lược này.

3.2. Chuyển đổi số trong các hoạt động hành chính văn phòng tại một số trường đại học ở Việt Nam

Nghiên cứu khảo sát về việc sử dụng các phần mềm và tiện ích số trong các nghiệp vụ hành chính văn phòng trong một số trường đại học cho thấy, các ứng dụng được triển khai phổ biến để hỗ trợ cho hoạt động quản lý điều hành hiện nay gồm:

Về thực trạng chuyển đổi số trong các trường đại học ở Việt Nam đã được nhiều nhà khoa học thực hiện và làm rõ trong nhiều hội thảo và các công trình nghiên cứu:

Đại học quốc gia Thành phố Hồ Chí Minh (ĐHQG-HCM) và các trường đại học thành viên đã xây dựng chiến lược chuyển đổi số tạo thành một "Hệ sinh thái chuyển đổi số" hỗ trợ công tác quản trị. Trong đó một số hoạt động liên quan đến chuyển đổi số trong lĩnh vực hành chính văn phòng được đề ra như sau: Phát triển các ứng dụng phục vụ công tác điều hành quản trị. Các hệ thống này bao gồm ứng dụng quản trị số - chữ ký số, văn phòng điện tử, thống kê dữ liệu phục vụ xếp hạng đại học, phục vụ xây dựng báo cáo, phục vụ công tác quản lý như khen thưởng, phân tích, xếp loại. Các ứng dụng này cần đảm bảo tính nhất quán và liên thông trong toàn hệ thống.

Trong bối cảnh chuyển đổi số trở thành xu thế tất yếu, ĐHQG-HCM đẩy mạnh thực hiện và hoàn thành giai đoạn 1 Đề án Chuyển đổi số, tạo phương thức quản trị, điều hành hệ thống tiên tiến, hiện đại. Trong năm 2024, công tác chuyển đổi số tại ĐHQG-HCM đã đạt được nhiều kết quả nổi bật như sau:

- Triển khai thành công văn phòng điện tử với ứng dụng IOC xử lý văn bản và ký số, kết nối trực tiếp với trục liên thông văn bản quốc gia. Hệ thống này không chỉ đảm bảo tính minh bạch, hiệu quả trong xử lý văn bản mà còn rút ngắn thời gian trao đổi thông tin giữa các đơn vị trong và ngoài hệ thống. Thống kê từ hệ thống IOC cho biết, từ ngày 1/1 đến 24/12/2024, ĐHQG-HCM tiếp nhận 7.450 văn bản đến, ban hành 4.019 văn bản đi, trình ký 5.413 văn bản, lưu trữ 85.342 file trên hệ thống IOC. Ban Giám đốc ĐHQG-HCM thực hiện 8.331 lượt chỉ đạo thực hiện nhiệm vụ của toàn ĐHQG-HCM qua hệ thống IOC, trong đó, 7.981 chỉ đạo đã được triển khai thực hiện, hoàn thành (đạt tỷ lệ 96%).

ĐHQG-HCM đã thu thập và quản lý dữ liệu của gần 6.000 nhà khoa học, giảng viên, viên chức, người lao động trong toàn hệ thống. Dữ liệu được đồng bộ hóa và phân quyền truy cập theo nhóm đối tượng, tạo điều kiện thuận lợi cho công tác quản trị và hoạch định chiến lược.

Trong đào tạo, ĐHQG-HCM đẩy mạnh xây dựng và vận hành hạ tầng công nghệ số phục vụ học tập, quản lý và hỗ trợ học tập (hệ thống quản lý, cơ sở dữ liệu môn học dùng chung, các hệ thống LMS và LCMS…). Đến nay, ĐHQG-HCM đã hoàn thiện 21 bài giảng MOOC và 71 bài giảng Blended Learning, mang đến môi trường học tập linh hoạt và hiện đại, hỗ trợ tích cực cho quá trình tự học, tự nghiên cứu của người học.

Song song đó, ĐHQG-HCM ban hành các văn bản quy định nhằm từng bước hoàn thiện khung pháp lý cho hoạt động quản trị, điều hành trên môi trường số như: Quy định về tiếp nhận, xử lý, phát hành và quản lý văn bản điện tử; Quy định quản lý và sử dụng chứng thư số, chữ ký số; Quy chế tạm thời về quản lý, lưu trữ và chia sẻ dữ liệu; Quy định tổ chức quản lý đào tạo khóa học MOOC... của ĐHQG-HCM (Lâm, 2024).

Đại học Thái Nguyên trong chương trình chuyển đổi số đã xác định 3 vấn đề chính cần tập trung thực hiện: 1- Chuyển đổi số trong quản trị đại học; 2- Chuyển đổi số trong đào tạo, trong đó đặt trọng tâm vào việc xây dựng các chương trình đào tạo mới, phù hợp với xu thế chuyển đổi số; 3- Chuyển đổi số trong nghiên cứu, sáng tạo. Trong đó, nhiệm vụ Chuyển đổi số trong quản trị đại học là nhiệm vụ trọng tâm, tập trung vào việc xây dựng cơ sở dữ liệu liên thông giữa Đại học vùng và đơn vị thành viên; phát triển hạ tầng ứng dụng công nghệ thông tin phục vụ công tác điều hành, tác nghiệp; cùng đó là đào tạo đội ngũ để nâng cao hiệu lực, hiệu quả trong công tác quản trị đại học. Báo cáo tổng kết chuyển đổi số năm 2023 của Trường Đại học Khoa học (Đại học Thái Nguyên) khẳng định: Một số phần mềm đã được ứng dụng, khai thác một cách có hiệu quả như: Phần mềm quản lý nguồn nhân lực - quản lý hành chính; Phần mềm thi trực tuyến TestOnline;

Phần mềm quản lý khóa học; Phần mềm quản lý sinh viên; Phần mềm quản lý tài chính; Phần mềm quản lý dữ liệu hành chính. Các phần mềm này đã cho thấy hiệu quả trong quá trình sử dụng, có sự liên thông, kết nối liên tục với nhau và được ứng dụng trong nhiều trường, nhiều kỳ học, nhiều lớp học. Đây cũng là đơn vị đã xây dựng thành công cơ sở dữ liệu dùng chung trong toàn trường và triển khai có hiệu quả công tác chuyển đổi số.

Chuyển đổi số tại Trường đại học Hải Phòng: Ngày 28/4/2022, Chủ tịch Hội đồng Trường Đại học Hải Phòng đã ban hành Nghị quyết số 19/NQ-HĐTĐHHP về ban hành chiến lược phát triển Trường Đại học Hải Phòng đến năm 2025, định hướng đến năm 2030. Trong hệ thống mục tiêu chiến lược, một trong những mục tiêu đầu tiên là xây dựng trường đại học số với hệ thống quản trị hiện đại, thông minh phát huy hiệu quả các nguồn lực đảm bảo tự chủ đại học với 3 mục tiêu cụ thể: 1-Từng bước xây dựng và vận hành Trường đại học số nhằm phát huy hiệu quả các nguồn lực; 2-Vận hành và phát triển bền vững các nguồn lực (nhân lực, tài chính, trang thiết bị, tài sản trí tuệ) đảm bảo năng lực tự chủ; 3- Xây dựng văn hóa trách nhiệm khát vọng đổi mới sáng tạo. Các giải pháp được đề xuất nâng cao hiệu quả chuyển đổi số của Trường Đại học Hải Phòng gồm: Ứng dụng công nghệ số trong công tác quản lý và đánh giá hiệu quả hoạt động theo hướng: cải cách hành chính theo hướng số hóa và ứng dụng các phần mềm hiện đại trong hoạt động quản trị; Hệ thống quản trị hỗ trợ phục vụ công tác điều hành bao gồm quản trị số - chữ ký số, văn phòng điện tử, thống kê dữ liệu phục vụ xếp hạng đại học, phục vụ xây dựng báo cáo, phục vụ công tác quản lý như khen thưởng, phân tích, xếp loại người lao động; Đổi mới phương pháp giảng dạy và học tập theo hướng số hóa kết hợp với liên kết đào tạo theo định hướng ứng dụng; Xây dựng các nền tảng chia sẻ tài nguyên phục vụ (Nhàn & Anh, 2022)

Chuyển đổi số tại Trường Đại học Kinh tế Quốc dân: Trường Đại học Kinh tế Quốc dân đã nhanh chóng tiếp cận và ứng dụng công nghệ thông tin trong các lĩnh vực giáo dục, đào tạo, quản lý khoa học và dịch vụ. Điều này nhằm mang lại những lợi ích tối ưu cho cả giảng viên và sinh viên trong bối cảnh Cách mạng công nghiệp 4.0. Nhà trường đã triển khai một loạt phương pháp học tập mới, bao gồm lớp học trực tuyến E-learning, học tập qua dự án và ứng dụng thực tế ảo. Những phương pháp này giúp cá nhân hóa quá trình học tập cho từng sinh viên, nâng cao hiệu quả giảng dạy và học tập một cách vượt trội. Ngoài ra, các phòng học được trang bị hệ thống thiết bị điện tử thông minh, biến chúng thành các phòng học thông minh. Những phần mềm quản lý được tích hợp giúp giảng viên theo dõi tiến trình học tập của sinh viên một cách hiệu quả. Trường cũng đã ứng dụng chuyển đổi số vào quy trình vận hành, bao gồm đăng ký môn học theo hình thức tín chỉ online, luân chuyển công văn và giấy tờ điện tử, quản lý các dịch vụ chung, cũng như quy trình hỗ trợ và tư vấn cho người học.

Chuyển đổi số trong quản trị đại học tại Trường Đại học Kinh tế - Tài chính Thành phố Hồ Chí Minh được thể hiện trên các khía cạnh nổi bật sau:

Ứng dụng hệ thống quản lý ERP (Enterprise Resource Planning): ERP là hệ thống hoạch định nguồn lực doanh nghiệp giúp tích hợp và quản lý các quy trình làm việc của một tổ chức, doanh nghiệp. Tại Trường đại học Kinh tế - Tài chính Thành phố Hồ Chí Minh, ERP được ứng dụng trong quản lý lao động của cán bộ, giảng viên, nhân viên trong trường. ERP giúp cho người lao động có thể đăng ký buổi làm việc, nghỉ bù, nghỉ phép, nghỉ theo chế độ quy định của trường. Thông qua thông tin được đăng ký, các lãnh đạo khoa và Văn phòng trường có thể nắm được thông tin về lịch làm việc văn phòng của các cán bộ, giảng viên, nhân viên thuộc quyền quản lý.

Triển khai Hệ thống đánh giá kết quả công tác của cán bộ, giảng viên, nhân viên: Chuyển đổi số trong công tác quản trị của các trường đại học còn được thể hiện qua việc triển khai Hệ thống đánh giá kết quả công tác của cán bộ, giảng viên, nhân viên tích hợp dữ liệu từ nhiều ứng dụng khác nhau. Hệ thống này giúp nâng cao tính chính xác, minh bạch và hiệu quả trong việc quản lý và đánh giá hiệu suất làm việc. Cụ thể, các yếu tố sau được tích hợp:

– *Dữ liệu tổng hợp số tiết giảng dạy:* Hệ thống ghi lại số tiết giảng dạy của cán bộ, giảng viên trong năm học, từ đó cho phép nhà trường theo dõi và đánh giá khối lượng công việc của từng giảng viên, giúp xác định những cá nhân có đóng góp tích cực trong hoạt động giảng dạy.

– *Điểm feedback của sinh viên về chất lượng giảng dạy của giảng viên:* Dữ liệu phản hồi của sinh viên về chất lượng giảng dạy của giảng viên được thu thập một cách hệ thống. Những đánh giá này không chỉ cung cấp thông tin quý báu cho cán bộ quản lý mà còn giúp giảng viên nhận diện điểm mạnh và điểm cần cải thiện trong phương pháp giảng dạy của mình.

– *Dữ liệu về khối lượng nghiên cứu khoa học:* Hệ thống theo dõi và đánh giá khối lượng nghiên cứu khoa học của cán

bộ, giảng viên, từ đó khuyến khích họ tham gia nhiều hơn vào các hoạt động nghiên cứu và phát triển, góp phần nâng cao uy tín của nhà trường.

– *Hệ thống máy quét vân tay (check in, check out):* Công nghệ này được áp dụng để quản lý, theo dõi và đánh giá thời gian làm việc của cán bộ, giảng viên, nhân viên trong nhà trường. Việc ghi nhận thời gian làm việc một cách chính xác giúp đảm bảo tính công bằng và minh bạch trong đánh giá hiệu suất lao động.

– *Hệ thống điểm danh bằng mã QR code:* Giải pháp này giúp điểm danh tham gia các chương trình, sự kiện và các hoạt động khác của cán bộ, giảng viên, nhân viên một cách thuận tiện và nhanh chóng. Dữ liệu từ hệ thống này không chỉ phục vụ cho việc điểm danh mà còn hỗ trợ trong việc phân tích mức độ tham gia của cán bộ, giảng viên trong các hoạt động của nhà trường.

– *Các ứng dụng hỗ trợ sinh viên:* Trường Đại học Kinh tế - Tài chính Thành phố Hồ Chí Minh đã tích cực triển khai chuyển đổi số trong quy trình vận hành trường học, mang lại nhiều lợi ích cho sinh viên. Cụ thể, sinh viên có thể đăng ký học các môn học theo hình thức tín chỉ online, giúp quá trình đăng ký trở nên nhanh chóng và thuận tiện hơn. Bên cạnh đó, việc đánh giá điểm rèn luyện cũng được thực hiện trực tuyến, cho phép sinh viên theo dõi và cập nhật kết quả một cách dễ dàng. Quy trình hỗ trợ và tư vấn cho người học cũng được tối ưu hóa thông qua các ứng dụng công nghệ, giúp sinh viên nhận được sự hỗ trợ kịp thời và hiệu quả.

Tổ chức hội họp trực tuyến: Các phần mềm như Teams, Zoom và Google Meet cho phép tổ chức hội họp, dạy học trực tuyến trực tuyến, thay vì phải hội họp, gặp mặt trực tiếp. Nhiều trường học và tổ chức hiện nay đã bố trí phòng họp trực tuyến, giúp đơn giản hóa quy trình tổ chức cuộc họp, giảm chi phí và cho phép thực hiện ở mọi không gian và thời gian. Số lượng khách mời cũng không bị giới hạn về khoảng cách địa lý.

Quản lý tài sản và trang thiết bị: Các phần mềm quản lý tài sản giúp văn phòng lưu trữ thông tin, thống kê, theo dõi và tổ chức việc mua sắm, sửa chữa một cách thuận lợi. Chúng cho phép lưu trữ và báo cáo đầy đủ các thông số liên quan đến tài sản và trang thiết bị, như ngày nhập kho, khấu hao, và thời hạn thanh lý. Nhân viên văn phòng có thể dễ dàng quản lý thông tin trên nền tảng số mà không cần phải trực tiếp kiểm tra.

Các xu hướng và ứng dụng công nghệ trong hoạt động văn phòng của các trường đại học trong quá trình chuyển đổi số:

Ứng dụng phần mềm văn phòng điện tử - số: Các ứng dụng như V-office (Viettel), e-Office và Cloud Office tích hợp với chữ ký số, cho phép người dùng tạo lập, chuyển giao, quản lý và lưu trữ văn bản, hồ sơ điện tử, cũng như theo dõi công việc và lịch công tác hoàn toàn trên môi trường số. Việc ứng dụng hệ thống lưu trữ đám mây và công nghệ Blockchain giúp bảo mật và lưu trữ dữ liệu an toàn, tiết kiệm chi phí và thời gian. Hơn nữa, các phần mềm này tự động hóa quy trình quản lý công việc, giúp dễ dàng theo dõi các nhiệm vụ chưa hoàn thành hoặc chậm tiến độ, từ đó có phương án xử lý kịp thời. Ngoài ra, để nâng cao hiệu quả thông tin và điều hành nội bộ, các trường đại học còn xây dựng và triển khai ứng dụng cổng thông tin portal để đăng tải thông tin, văn bản quản lý, hướng dẫn các quy trình, quy định, lịch làm việc của lãnh đạo nhà trường, tin tức hoạt động…

Tăng cường ứng dụng công nghệ: Các công nghệ phân tích và tổng hợp dữ liệu, kết hợp với giải pháp tìm kiếm thông minh dựa trên trí tuệ nhân tạo (AI) và máy học (machine learning), giúp thu thập, xử lý và tổng hợp thông tin hiệu quả. Điều này cho phép thông tin được thu thập từ nhiều nguồn khác nhau, phân tích đa chiều và tổng hợp kết quả trong thời gian ngắn. Nhờ vậy, văn phòng có thể cung cấp thông tin hỗ trợ lãnh đạo trong việc ra quyết định quản lý. Ví dụ, một số trường đại học đã sử dụng AI để phân tích dữ liệu học tập của sinh viên, từ đó dự đoán khả năng thành công hoặc rủi ro bỏ học. Hệ thống AI sẽ phân tích các yếu tố như điểm số, tham gia lớp học và kết quả khảo sát để đưa ra những cảnh báo sớm cho các giảng viên và cố vấn học tập.

3.3. Nhận xét, đánh giá về vai trò và tác động của chuyển đổi số trong lĩnh vực hành chính văn phòng với quản trị đại học

Chuyển đổi số (digital transformation) ngày càng trở thành yếu tố quyết định trong việc nâng cao hiệu quả quản lý và phát triển bền vững trong lĩnh vực hành chính văn phòng, đặc biệt là trong quản trị đại học. Ứng dụng công nghệ số trong hành chính văn phòng tại các trường đại học đã mang lại những bước tiến đáng kể trong công tác quản trị và điều hành. Việc này không chỉ tối ưu hóa quy trình làm việc mà còn cải thiện tính chính xác và hiệu quả trong quản lý thông

tin và dữ liệu. Dưới đây là một số đánh giá về vai trò và tác động của chuyển đổi số trong lĩnh vực này:

1) Tăng cường hiệu quả quản lý

Chuyển đổi số trong các trường đại học đã tạo ra những thay đổi tích cực đáng kể trong công tác quản lý, nhờ vào việc sử dụng các phần mềm quản lý thông minh. Những công nghệ này cho phép tích hợp dữ liệu từ nhiều nguồn khác nhau, mang lại cái nhìn toàn diện và sâu sắc về các hoạt động trong nhà trường. Việc ứng dụng công nghệ phân tích và tổng hợp dữ liệu, đặc biệt là trí tuệ nhân tạo (AI) và máy học, đã giúp văn phòng có khả năng phân tích thông tin nhanh chóng và chính xác. Điều này không chỉ hỗ trợ lãnh đạo trong việc ra quyết định mà còn giúp dự đoán sớm những vấn đề tiềm ẩn trong học tập và công tác, từ đó có thể triển khai các giải pháp kịp thời.

2) Cải thiện quy trình làm việc

Chuyển đổi số đã mang lại những cải thiện đáng kể cho quy trình làm việc tại các trường đại học, đặc biệt thông qua việc áp dụng các phần mềm văn phòng điện tử như V-office và Cloud Office. Những công cụ này đã thay đổi cách thức quản lý văn bản và hồ sơ, giúp chuyển đổi từ hồ sơ giấy sang hồ sơ điện tử. Việc này không chỉ tiết kiệm thời gian và chi phí mà còn nâng cao khả năng bảo mật và quản lý dữ liệu hiệu quả hơn.

Hệ thống quản lý tài nguyên doanh nghiệp (ERP) cũng đã đóng vai trò quan trọng trong việc tích hợp và tự động hóa các quy trình quản lý nhân sự. Sự tích hợp này giúp cải thiện sự phối hợp giữa các bộ phận, giảm thiểu sai sót trong công việc và tăng cường tính chính xác trong quản lý tài nguyên.

Chuyển đổi số còn cho phép cung cấp dịch vụ hành chính liên tục, giúp người dùng có thể truy cập thông tin và dịch vụ bất cứ lúc nào. Tại Trường Đại học Kinh tế - Tài chính Thành phố Hồ Chí Minh với các ứng dụng quản lý thông tin trên nền tảng web như cổng thông tin Portal, website nội bộ… các văn bản, quyết định, kế hoạch và thông tin được truyền tải kịp thời, hiệu quả đến toàn bộ nhân sự của nhà trường. Sự linh hoạt này không chỉ nâng cao trải nghiệm của người dùng mà còn giúp các trường đại học đáp ứng nhanh chóng và hiệu quả hơn với các yêu cầu và thách thức phát sinh trong quá trình quản lý.

3) Giảm thiểu sai sót, tiết kiệm thời gian, tiết kiệm chi phí

Chuyển đổi số đã giúp giảm thiểu sai sót và tiết kiệm thời gian cho các trường đại học. Việc thiết lập quy trình chuẩn thông qua công nghệ số giảm thiểu lỗi do con người và đảm bảo tính chính xác trong báo cáo. Hệ thống tự động hóa rút ngắn thời gian xử lý nhiệm vụ, cho phép nhân viên truy cập thông tin nhanh chóng, từ đó nâng cao hiệu suất làm việc.

4) Thúc đẩy văn hóa minh bạch và trách nhiệm

Hệ thống đánh giá kết quả công tác, được tích hợp dữ liệu từ nhiều nguồn, đã tạo ra một nền tảng minh bạch cho việc đánh giá hiệu suất của cán bộ, giảng viên và nhân viên. Các phản hồi từ sinh viên về chất lượng giảng dạy, cùng với dữ liệu về khối lượng nghiên cứu khoa học, giúp nhà trường không chỉ đánh giá mà còn khuyến khích sự phát triển chuyên môn của cán bộ, giảng viên, nhân viên.

5) Nâng cao trải nghiệm người dùng

Chuyển đổi số đã đóng vai trò quan trọng trong việc nâng cao trải nghiệm người dùng tại các trường đại học, đặc biệt thông qua việc tổ chức hội họp trực tuyến. Các phần mềm như Teams và Zoom đã tạo điều kiện thuận lợi cho việc giao lưu và hợp tác giữa các bộ phận, giảm gánh nặng về chi phí và thời gian di chuyển. Nhờ vào tính năng này, cán bộ, giảng viên và sinh viên có thể tham gia các cuộc họp và sự kiện mà không bị ràng buộc bởi khoảng cách địa lý, từ đó tăng cường sự tương tác và kết nối giữa các cá nhân và nhóm.

Hệ thống điểm danh bằng mã QR code cũng đã góp phần quan trọng vào việc tối ưu hóa quy trình điểm danh trong các sự kiện, tiết kiệm thời gian cho cả người tổ chức và người tham gia. Việc sử dụng mã QR không chỉ giúp điểm danh nhanh chóng mà còn giảm thiểu sai sót so với các phương pháp truyền thống.

6) Định hướng phát triển bền vững

Chuyển đổi số không chỉ nâng cao hiệu quả quản lý mà còn đóng vai trò quan trọng trong định hướng phát triển bền vững. Việc giảm thiểu tác động môi trường thông qua việc giảm lượng giấy tờ sử dụng là một lợi ích nổi bật. Công nghệ cũng thúc đẩy trách nhiệm xã hội của các tổ chức giáo dục, giúp các trường đại học triển khai các chương trình phát triển bền vững và tạo tác động tích cực đến cộng đồng.

Tóm lại, chuyển đổi số trong hành chính văn phòng là yếu tố then chốt trong quản trị đại học, tạo ra môi trường làm việc hiện đại, hiệu quả và minh bạch. Sự chuyển mình này không chỉ nâng cao hiệu suất làm việc mà còn giúp các trường đại học đáp ứng tốt hơn nhu cầu của cán bộ, giảng viên và sinh viên trong thời đại số, đồng thời đảm bảo phát triển bền vững cho tương lai.

3.4. Thách thức trong chuyển đổi số

Chuyển đổi số mang lại nhiều lợi ích, nhưng cũng đối mặt với không ít thách thức. Dưới đây là một số rào cản chính mà tổ chức thường gặp phải trong quá trình này:

– *Rào cản công nghệ:* Việc triển khai công nghệ mới thường đòi hỏi một khoản đầu tư lớn, từ phần cứng đến phần mềm và cơ sở hạ tầng. Bên cạnh đó là sự không tương thích giữa các hệ thống cũ với công nghệ mới, gây khó khăn trong việc tích hợp và chuyển đổi. Ngoài ra, vấn đề bảo mật và an ninh dữ liệu cũng cần lưu ý trong quá trình chuyển đổi số. Sự gia tăng sử dụng công nghệ số cũng làm tăng nguy cơ về an ninh mạng và bảo mật dữ liệu, đòi hỏi các biện pháp bảo vệ mạnh mẽ.

– *Rào cản nhân lực:* Nhân viên có thể thiếu kỹ năng cần thiết để làm việc với các công nghệ mới, dẫn đến sự chậm trễ trong việc triển khai. Một số nhân viên có thể cảm thấy không thoải mái hoặc kháng cự với sự thay đổi, ảnh hưởng đến quá trình chuyển đổi. Cần có một kế hoạch đào tạo rõ ràng để đảm bảo rằng nhân viên có thể làm quen với các công nghệ mới.

– *Rào cản văn hóa tổ chức:* Chuyển đổi số sẽ gặp khó khăn nếu lãnh đạo không có tầm nhìn rõ ràng về chuyển đổi số hoặc không cam kết đầu tư, quá trình này sẽ gặp khó khăn. Một môi trường văn hóa bảo thủ, ngại thay đổi có thể cản trở sự đổi mới và sáng tạo, làm chậm quá trình chuyển đổi. Bên cạnh đó là sự thiếu sự hợp tác trong tổ chức, nếu các phòng ban không làm việc cùng nhau, việc triển khai công nghệ mới sẽ trở nên khó khăn hơn.

Chuyển đổi số là một quá trình phức tạp, và các thách thức như rào cản công nghệ, nhân lực và văn hóa tổ chức có thể ảnh hưởng đến thành công của nó. Để vượt qua những thách thức này, tổ chức cần xây dựng một chiến lược rõ ràng, đầu tư vào đào tạo và phát triển nhân lực, cũng như tạo ra một văn hóa tổ chức hỗ trợ sự thay đổi.

4. KẾT LUẬN VÀ KIẾN NGHỊ

Chuyển đổi số trong lĩnh vực hành chính văn phòng đã trở thành một yếu tố then chốt trong quản trị đại học, góp phần nâng cao hiệu quả quản lý, cải thiện quy trình làm việc và tạo ra môi trường học tập tích cực. Những lợi ích mà chuyển đổi số mang lại, từ việc tối ưu hóa quy trình quản lý đến nâng cao trải nghiệm người dùng, đều chứng tỏ rằng công nghệ số không chỉ là một xu hướng mà còn là một yêu cầu thiết yếu trong bối cảnh hiện đại.

Tuy nhiên, quá trình chuyển đổi số cũng gặp phải nhiều thách thức, bao gồm rào cản công nghệ, nhân lực và văn hóa tổ chức. Những khó khăn này cần được nhận diện và giải quyết một cách có hệ thống để đảm bảo sự thành công của quá trình chuyển đổi.

KIẾN NGHỊ

– *Xây dựng chiến lược chuyển đổi số rõ ràng:* Các trường đại học cần phát triển một chiến lược chuyển đổi số toàn diện, xác định mục tiêu cụ thể và lộ trình thực hiện. Điều này sẽ giúp định hướng và tạo sự đồng thuận trong tổ chức.

– *Đầu tư vào đào tạo nhân lực:* Cần thiết lập các chương trình đào tạo và phát triển kỹ năng cho nhân viên, giúp họ làm quen với công nghệ mới và nâng cao khả năng ứng dụng công nghệ trong công việc hàng ngày.

– *Tạo dựng văn hóa hỗ trợ đổi mới:* Các lãnh đạo nên khuyến khích một môi trường làm việc cởi mở, nơi mà sự sáng tạo và đổi mới được đánh giá cao. Điều này sẽ giúp giảm bớt sự kháng cự đối với sự thay đổi.

– *Tăng cường hợp tác giữa các phòng ban:* Việc xây dựng các kênh giao tiếp và hợp tác giữa các bộ phận là rất cần thiết để đảm bảo rằng quá trình triển khai công nghệ mới diễn ra suôn sẻ và hiệu quả.

– *Đảm bảo an ninh và bảo mật dữ liệu:* Cần thiết lập các biện pháp bảo vệ dữ liệu mạnh mẽ, nhằm giảm thiểu rủi ro về an ninh mạng trong quá trình chuyển đổi số.

Chuyển đổi số là một hành trình dài và phức tạp. Tuy nhiên, với những chiến lược và biện pháp phù hợp, các trường đại học có thể không chỉ nâng cao hiệu quả quản lý mà còn góp phần vào sự phát triển bền vững của nền giáo dục trong tương lai.

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ỨNG DỤNG BLOCKCHAIN NÂNG CAO BẢO MẬT VÀ PHÁT TRIỂN HỆ THỐNG TÀI CHÍNH BỀN VỮNG

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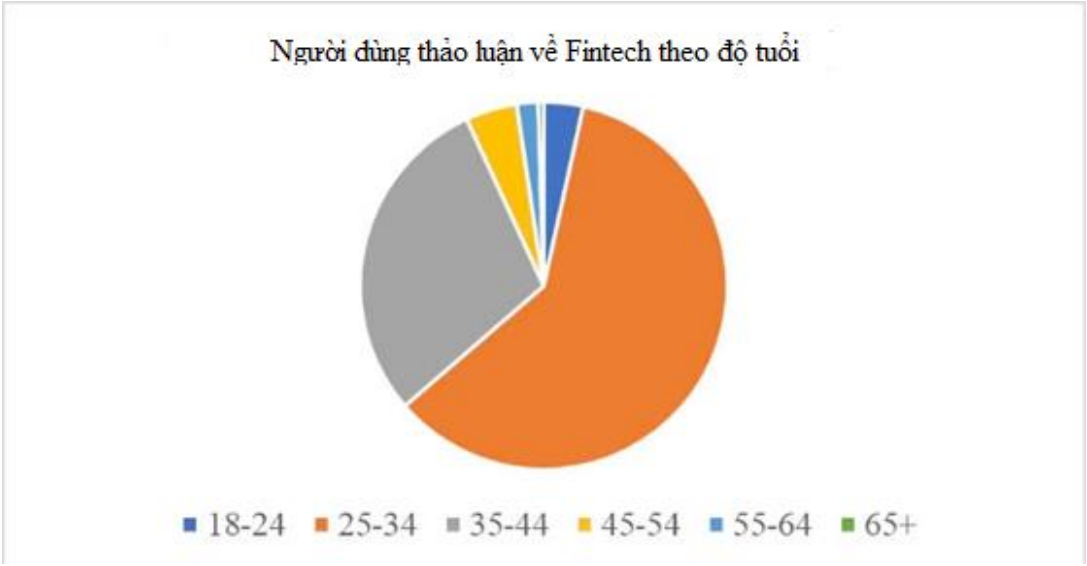
TÓM TẮT

Trong những năm gần đây, các cuộc tấn công vào hệ thống tài chính trở nên ngày càng phức tạp và tinh vi, với những hình thức như Ransomware, Phishing, và DDoS không chỉ gia tăng về số lượng mà còn khó phát hiện hơn, gây thiệt hại nghiêm trọng cho cả tổ chức và cá nhân. Hệ thống bảo mật truyền thống đã không còn đủ khả năng để đối phó với những mối đe dọa này. Một trong những giải pháp đầy triển vọng nhằm tăng cường bảo mật cho các dịch vụ tài chính số là công nghệ Blockchain. Với tính phi tập trung, minh bạch và không thể thay đổi, Blockchain mang lại một cách tiếp cận toàn diện giúp gia tăng độ tin cậy và bảo mật cho các giao dịch tài chính. Bên cạnh đó, công nghệ này còn cho phép các bên tham gia tương tác trực tiếp mà không cần qua trung gian, từ đó giảm thiểu nguy cơ bị tấn công và bảo vệ dữ liệu cá nhân tốt hơn. Bài nghiên cứu này sẽ tập trung phân tích sự tăng cường bảo mật của ứng dụng Blockchain, ngoài ra đề xuất các cơ hội nhằm tăng cường lĩnh vực này phát triển bền vững trong tương lai.

Từ khóa: Bảo mật, Blockchain, hệ thống tài chính, giao dịch tài chính.

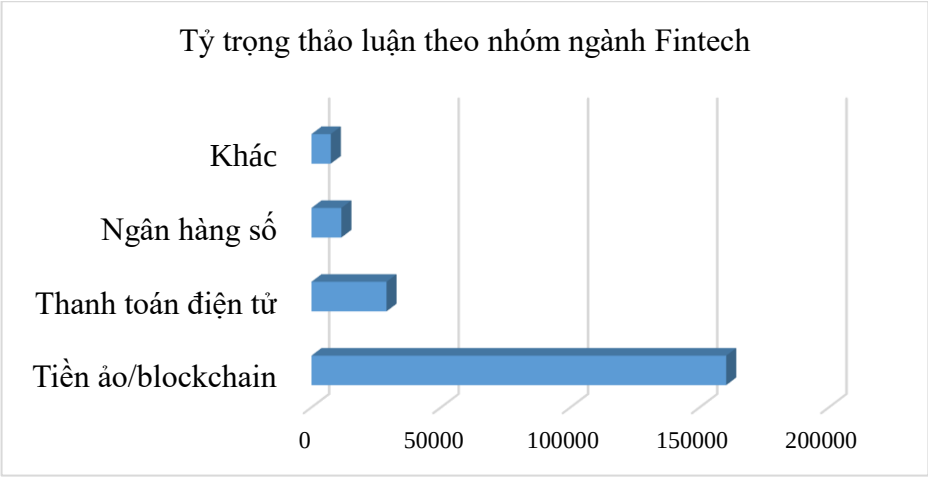
1. TỔNG QUAN

Blockchain đang trở thành một trong những nền tảng công nghệ về bảo mật và hiệu quả trong ngành tài chính, trở thành nền tảng thiết yếu cho sự phát triển của FinTech. Với khả năng ghi nhận và bảo vệ dữ liệu trong một hệ thống sổ cái phân tán, Blockchain không chỉ nâng cao tính minh bạch và độ an toàn trong giao dịch mà còn đem lại những cải tiến quan trọng trong quản lý và bảo mật tài chính. Công nghệ này, nhờ các đặc tính như tính phi tập trung, không thể chỉnh sửa và khả năng tự động hóa thông qua hợp đồng thông minh, đang thu hút mạnh mẽ sự quan tâm của các tổ chức tài chính và người dùng trên toàn cầu.



Hình 1. Người dùng thảo luận về Fintech theo độ tuổi trong năm 2024

Theo Reputa, có hơn 400 nghìn lượt thảo luận về Fintech trong năm 2024. Theo thống kê được thể hiện trong hình 1 và hình 2, ta thấy độ tuổi quan tâm đến Blockchain và tiền ảo chủ yếu từ 25 đến 34, minh chứng cho việc thế hệ trẻ đang nhanh chóng tiếp cận và đón đầu xu hướng công nghệ mới này.



Hình 2. Tỷ trọng thảo luận theo nhóm ngành Fintech trong năm 2024

Với sự phát triển vượt bậc của nền kinh tế số và yêu cầu ngày càng cao về bảo mật dữ liệu, Blockchain đã và đang chứng tỏ vai trò của mình trong việc giảm thiểu rủi ro gian lận và tối ưu hóa quy trình giao dịch. Đồng thời, Blockchain tạo ra một cơ chế bảo vệ hiệu quả chống lại các cuộc tấn công mạng và cung cấp một nền tảng bảo mật vững chắc thông qua mật mã học và quy trình đồng thuận. Mặc dù các ưu điểm của Blockchain rõ ràng là nổi bật, việc ứng dụng vào bảo mật tài chính còn gặp nhiều khó khăn, chẳng hạn như chi phí triển khai cao, khó khăn trong tích hợp với các hệ thống hiện có và các mối đe dọa bảo mật đang phát triển theo từng ngày. Các giải pháp hiện nay đang cố gắng vượt qua những thách thức này để Blockchain có thể hỗ trợ toàn diện hơn cho ngành tài chính trong một thế giới đầy biến động.

Trong bài viết này, chúng tôi tập trung phân tích các tiềm năng và thách thức của việc áp dụng Blockchain để bảo mật cho các hoạt động tài chính, đánh giá tác động của công nghệ này đối với việc bảo vệ dữ liệu và duy trì an toàn thông tin, và đưa ra các phương hướng nhằm nâng cao tính khả thi trong ứng dụng Blockchain vào lĩnh vực tài chính trong tương lai.

2. PHƯƠNG PHÁP NGHIÊN CỨU

Trong nghiên cứu này, chúng tôi sử dụng phương pháp phân tích tổng hợp và so sánh để đánh giá tác động của Blockchain đối với bảo mật tài chính. Trước tiên, chúng tôi tiến hành phân tích tài liệu bằng cách thu thập và tổng hợp thông tin từ các nghiên cứu trước đây, tài liệu khoa học, báo cáo ngành và các bài báo học thuật liên quan. Ngoài ra, nghiên cứu tình huống (case study) được sử dụng để xem xét các trường hợp ứng dụng thực tế của Blockchain trong tài chính. Cuối cùng, nghiên cứu đã chỉ ra những lợi ích và ứng dụng nổi bật mà Blockchain mang lại trong bảo mật tài chính, đồng thời phân tích các thách thức cần khắc phục để công nghệ này có thể được áp dụng rộng rãi và hiệu quả hơn trong thực tiễn. Những phương pháp nghiên cứu này giúp đánh giá tiềm năng của Blockchain đối với bảo mật tài chính để nâng cao hiệu quả ứng dụng trong thực tiễn.

3. TỔNG QUAN VÀ ỨNG DỤNG VỀ BLOCKCHAIN

3.1. Tổng quan về Blockchain

Blockchain hiện đang là một xu hướng thu hút sự chú ý của các nhà đầu tư và được ứng dụng rộng rãi trong nhiều lĩnh vực như tài chính, điện tử, kế toán, và viễn thông. Blockchain là cơ sở dữ liệu phân tán lưu trữ thông tin trong các khối (block) được mã hóa và liên kết thành một chuỗi (chain). Mỗi khối chứa dữ liệu giao dịch, mã thời gian, và liên kết với khối trước đó, tạo thành một chuỗi khép kín.

Công nghệ này được phát minh bởi Satoshi Nakamoto vào năm 2008 và được hiện thực hóa một năm sau đó như một phần cốt lõi của Bitcoin (Nakamoto, 2008) Trước đây, nhiều ngân hàng từng chỉ trích và nghi ngờ công nghệ Blockchain và tiền điện tử (Attaran, 2019). Tuy nhiên, hiện nay Blockchain trở thành chủ đề nóng trong tài chính nhờ tính hiệu quả, chi phí thấp và khả năng xử lý giao dịch nhanh chóng. Từ góc độ cơ sở hạ tầng, Blockchain đã mang đến sự thay đổi đáng kể trong mô hình hệ sinh thái tài chính và ngân hàng (Kshetri, 2017).

Blockchain có tính ẩn danh (anonymity), nhưng để đảm bảo tin cậy (trust), mọi giao dịch phải được xác minh trước khi thêm vào block nhằm tránh gian lận như chi tiêu gấp đôi. Các thuật toán đồng thuận như Proof of Work (PoW)

(Sriman, 2021), Proof of Stake (PoS) (Asif, 2023) và Delegated Proof of Stake (DPoS) (Hu, 2021) đóng vai trò quan trọng trong việc xác thực giao dịch một cách minh bạch và an toàn.

Blockchain tạo ra giao dịch giữa các bên không tin cậy lẫn nhau, cho phép các giao dịch và hồ sơ an toàn, đáng tin cậy được thực hiện. Nếu không có Blockchain để tạo ra sự tin cậy này, một bên trung gian thứ ba là cần thiết. Blockchain sử dụng mật mã học và sự hợp tác để xây dựng niềm tin, nhờ đó loại bỏ nhu cầu phải có một tổ chức tập trung làm trung gian. Thông tin trên Blockchain được lưu trữ trên sổ cái thông qua mã hóa, đảm bảo tính bảo mật và toàn vẹn dữ liệu trong quá trình giao dịch

3.2. Ứng dụng Blockchain trong bảo mật tài chính

Blockchain cho thấy các ứng dụng tiềm năng trong lĩnh vực dịch vụ tài chính. Các khoản phí giao dịch, từ đó các tổ chức tài chính truyền thống kiếm lời, có thể được giảm hoặc loại bỏ nhờ vào Blockchain. Người tiêu dùng phải phụ thuộc vào các ngân hàng hoặc tổ chức bên ngoài để thực hiện các giao dịch chuyển tiền. Việc triển khai Blockchain có thể loại bỏ các trung gian như ngân hàng, qua đó loại bỏ phí và các chi phí liên quan đến các dịch vụ này (Chang, 2019). Do đó, các ngân hàng có thể gặp vấn đề với khối lượng giao dịch và doanh thu từ các giao dịch. Công nghệ này cho phép các chuỗi công khai và riêng tư giao tiếp với nhau. Bằng cách tạo ra các kết nối và khả năng lập trình chưa từng có giữa hàng hóa, dịch vụ, tài sản và các khoản nắm giữ, việc số hóa các công cụ tài chính, bao gồm tài sản kỹ thuật số, hợp đồng thông minh và tiền tệ có thể lập trình, mở rộng các lợi ích của Blockchain. Việc số hóa này cho phép xác minh nguồn gốc tài sản và toàn bộ lịch sử giao dịch trong một nguồn sự thật chung duy nhất, đồng thời đảm bảo tính toàn vẹn của dữ liệu. Tăng cường tự động hóa cải thiện hiệu quả hoạt động tổng thể. Các giao dịch thanh toán, kiểm toán và báo cáo thời gian thực được thực hiện, và thời gian xử lý, khả năng sai sót và chậm trễ, cùng với số lượng các giai đoạn và các bên trung gian tham gia đều giảm xuống so với các quy trình truyền thống.

Blockchain là một công nghệ tạo ra bản ghi giao dịch trực tuyến có sẵn, an toàn và không thể xâm phạm. Giống như internet, Blockchain là một bản ghi giao dịch được chia sẻ, phân tán trên một mạng lưới người dùng rộng lớn và không có cơ quan trung ương. Công nghệ này được cấu thành từ nhiều khối dữ liệu, mỗi khối chứa một tập hợp các giao dịch. Các khối này được liên kết và bảo vệ bằng mật mã tiên tiến. Các sàn giao dịch chứng khoán lớn đang nghiên cứu cách Blockchain có thể giúp việc thanh toán chứng khoán gần như tức thì bằng cách giảm thời gian giao dịch và chi phí overhead. Hệ thống này tăng cường bảo mật và tính minh bạch đồng thời tự động hóa việc tuân thủ các hợp đồng thông minh. Ngành dịch vụ tài chính sử dụng Blockchain ngày càng nhiều hơn; phát minh này đã cách mạng hóa hệ thống tài chính toàn cầu và cải thiện hiệu quả và bảo mật cho các hoạt động tài chính. Nguyên lý xây dựng một mạng lưới toàn cầu sử dụng Blockchain vừa tiết kiệm chi phí vừa có thể minh bạch được gọi là "thanh toán xuyên biên giới" và đây là lợi thế chính của Blockchain. Chi phí được giảm trong khi người tìm kiếm dịch vụ nhận được giá trị gia tăng (Aad, 2023).

Blockchain có thể giảm chi phí cho các nhà cung cấp dịch vụ tài chính và người dùng cuối, đồng thời nâng cao tính minh bạch, hiệu quả, niềm tin và bảo mật của các giao dịch thanh toán. Trước khi có Blockchain, các khoản thanh toán giữa các ngân hàng có thể mất đến một tuần để chuyển tiền. Thông qua tiền tệ kỹ thuật số và công nghệ sổ cái phân tán, các giao dịch thanh toán nhanh hơn, ít tốn kém hơn và thuận tiện hơn. Các ngân hàng trung ương đang thử nghiệm khả năng tích hợp công nghệ sổ cái phân tán vào các hệ thống thanh toán được thiết kế lại. Việc để lại dấu vết kỹ thuật số trên Blockchain cũng sẽ giúp các sản phẩm có giá trị nhờ vào việc xác định nguồn gốc của chúng. Một nền tảng sự thật và niềm tin là một sổ cái phân tán không thể thay đổi, không thể hack, chứa tài sản kỹ thuật số. Sự tác động là rất lớn đối với gần như mọi lĩnh vực trong xã hội, không chỉ riêng ngành dịch vụ tài chính. Có một nhu cầu lớn về các kỹ sư phần mềm Blockchain, điều này làm tăng chi phí phát triển và duy trì các sản phẩm dựa trên Blockchain. Mặc dù có nhiều lợi ích khi sử dụng các ứng dụng Blockchain, nhưng việc tích hợp chúng với các hệ thống cũ và dữ liệu ngoài chuỗi có thể gặp khó khăn. Các nhà phát triển phải vượt qua một số trở ngại trước khi có thể kết nối ứng dụng của họ với các dịch vụ được cung cấp bởi các Blockchain khác nhau (Dutta, 2020; Javaid, 2022).

4. CASE STUDY: SANTANDER'S ONE PAY FX VÀ HSBC'S USE OF BLOCKCHAIN

Santander's One Pay FX – Cách Blockchain Cải Tiến Thanh Toán Quốc Tế. Santander, một trong những ngân hàng lớn nhất thế giới, đã triển khai One Pay FX, một dịch vụ thanh toán xuyên biên giới dựa trên Blockchain, nhằm cải thiện tốc độ, chi phí và tính minh bạch của giao dịch quốc tế (Peters & Panayi, 2016). Trước đây, các giao dịch xuyên biên giới qua hệ thống ngân hàng truyền thống thường mất từ 3-5 ngày để hoàn tất, tốn kém do phí trung gian và thiếu minh bạch

về chi phí cũng như tỷ giá hối đoái. Để giải quyết những vấn đề này, Santander đã áp dụng công nghệ RippleNet, cho phép giao dịch hoàn tất chỉ trong vài giây thay vì vài ngày, loại bỏ nhu cầu về ngân hàng trung gian, từ đó giảm chi phí đáng kể. Đồng thời, khách hàng có thể theo dõi trạng thái giao dịch, chi phí và tỷ giá hối đoái theo thời gian thực, giúp tăng cường tính minh bạch. Kết quả là sau khi triển khai, 95% giao dịch được hoàn thành trong cùng ngày, đặc biệt tại các quốc gia như Anh, Tây Ban Nha, Ba Lan và Brazil. Việc áp dụng Blockchain không chỉ giúp Santander nâng cao trải nghiệm khách hàng mà còn giảm chi phí vận hành, khẳng định tiềm năng của công nghệ này trong ngành tài chính. Trường hợp của One Pay FX cho thấy Blockchain có thể cải thiện đáng kể thanh toán xuyên biên giới, giúp giao dịch nhanh hơn, chi phí thấp hơn và minh bạch hơn, đồng thời chứng minh rằng hợp tác với các công ty công nghệ Blockchain như Ripple là một hướng đi hiệu quả để hiện đại hóa dịch vụ tài chính.

HSBC's Use of Blockchain for Trade Finance Payment – Cách Blockchain cải tiến thanh toán Tài trợ thương mại. HSBC đã tích hợp nền tảng Contour, một giải pháp tài chính thương mại dựa trên Blockchain, nhằm tối ưu hóa quy trình xử lý thanh toán và nâng cao tính minh bạch. Trước đây, quá trình thanh toán tài trợ thương mại có thể mất đến mười ngày hoặc hơn, gây tốn kém và thiếu hiệu quả. Để khắc phục vấn đề này, HSBC đã triển khai Contour, một nền tảng dựa trên blockchain giúp xác minh tài liệu thương mại theo thời gian thực, cho phép cả người mua và người bán truy cập và kiểm tra tài liệu ngay lập tức. Nhờ đó, rủi ro gian lận được giảm thiểu đáng kể, đồng thời sai sót trong giao dịch cũng được hạn chế. Tính chất phi tập trung và bất biến của Blockchain đảm bảo các giao dịch diễn ra an toàn, nâng cao hiệu quả hoạt động và giảm chi phí. Kết quả là thời gian xử lý giao dịch được rút ngắn đáng kể, giúp HSBC cải thiện trải nghiệm khách hàng và tăng tính minh bạch trong thanh toán tài trợ thương mại. Trường hợp của HSBC và Contour cho thấy Blockchain có thể đóng vai trò quan trọng trong việc tối ưu hóa các quy trình tài chính, giúp giao dịch nhanh hơn, an toàn hơn và tiết kiệm chi phí hơn, đồng thời khẳng định tiềm năng của công nghệ này trong lĩnh vực dịch vụ tài chính.

KẾT QUẢ VÀ THẢO LUẬN

Kết quả nghiên cứu cho thấy Blockchain mang lại nhiều lợi ích quan trọng trong việc tăng cường bảo mật tài chính và bảo vệ dữ liệu cá nhân. Tuy nhiên, công nghệ này cũng đối mặt với nhiều thách thức, đặc biệt là về bảo mật mã phần mềm, kiểm toán hợp đồng thông minh, bảo vệ quyền riêng tư và mở rộng hệ sinh thái Blockchain.

Thứ nhất, chúng ta có thể thấy rằng gần như mỗi năm đều có các cuộc tấn công vào mã phần mềm và hợp đồng thông minh. Bảo mật là yếu tố không thể thương lượng đối với bất kỳ phần mềm nào liên quan đến tài sản. Bảo mật hợp đồng thông minh đặc biệt quan trọng vì hợp đồng thông minh xử lý thông tin có giá trị, ví dụ như tiền điện tử, token và các tài sản kỹ thuật số khác. Các giao dịch được thực hiện với hợp đồng thông minh là không thể đảo ngược, và mã phần mềm của hợp đồng thông minh rất khó bị sửa đổi hoặc vá lỗi nếu phát hiện ra lỗi. Một số ràng buộc đối với hợp đồng thông minh đã được áp dụng để bảo vệ môi trường Blockchain khỏi các cuộc tấn công. Ngoài việc các tài khoản và giao dịch không thể thay đổi và được bảo mật thông qua các chuỗi được băm mã hóa, ví dụ như EOS đối mặt với thách thức bảo mật khi thực thi hợp đồng thông minh để chống lại các cuộc tấn công độc hại. Vào năm 2020, một nghiên cứu về Flash Boys 2.0 tiếp tục chỉ ra những rủi ro của hợp đồng thông minh mà các bot giao dịch chênh lệch giá và giá trị có thể khai thác từ việc sắp xếp giao dịch trong hợp đồng thông minh gây ra mối đe dọa thực tế đối với Ethereum (Daian, 2020). Theo nghiên cứu này (Zou, 2019), việc đảm bảo bảo mật mã hợp đồng thông minh là rất khó, và do đó, bảo vệ sự an toàn của hợp đồng thông minh vẫn là một trong những thách thức nổi bật đối với Blockchain.

Thứ hai, kiểm toán và phát hiện bất thường đóng vai trò quan trọng trong việc nâng cao độ an toàn của Blockchain (Zhou, 2018). Việc áp dụng công nghệ học máy và học sâu để phân tích giao dịch có thể giúp phát hiện sớm các hành vi gian lận hoặc tấn công mạng. Các nghiên cứu như ETH-EDS đã chứng minh tính hiệu quả của phương pháp này trong phát hiện tấn công eclipse trên Ethereum (Xu, 2020).

Thứ ba, với việc ngày càng nhiều dữ liệu được lưu trữ trên Blockchain, một mối quan tâm từ các tổ chức và cá nhân là rò rỉ quyền riêng tư. Một số kỹ thuật như làm mờ mã, mã hóa đồng nhất, nền tảng thực thi đáng tin cậy (ví dụ: Intel SGX), và hợp đồng thông minh để bảo vệ quyền riêng tư có thể là những hướng đi triển vọng trong tương lai.

Cuối cùng, khi các loại tiền điện tử dựa trên Bitcoin và Ethereum gặp phải vấn đề về khả năng mở rộng và phí giao dịch, IOTA (Internet of Things Application) có thể là một sự thay thế tốt nhờ cấu trúc rất khác biệt với các đỉnh và cạnh sử dụng đồ thị có hướng thay vì chuỗi khối. Với công nghệ Tangle, IOTA tuyên bố có thể mở rộng mà không có giới hạn và không tính phí giao dịch. Tuy nhiên, công nghệ Tangle gặp phải một số vấn đề như không thể lưu trữ đúng thứ tự các

giao dịch và các lỗ hổng liên quan đến hàm băm IOTA tự thiết kế gọi là Curl. IOTA cần vượt qua những thử thách này. Khi công nghệ trưởng thành, giải pháp này được kỳ vọng sẽ được áp dụng rộng rãi trong ngành IoT, một lĩnh vực phát triển nhanh chóng và có tiềm năng lớn (Guo, 2022).

Tóm lại, Blockchain mang lại nhiều cơ hội nhưng cũng đối mặt với không ít thách thức. Việc cải tiến bảo mật hợp đồng thông minh, phát triển công cụ kiểm toán tự động, ứng dụng AI trong giám sát mạng và tìm kiếm các mô hình Blockchain tối ưu hơn sẽ là hướng đi quan trọng trong tương lai để đảm bảo sự an toàn và hiệu quả của công nghệ này.

6. KẾT LUẬN

Blockchain đã và đang chứng minh vai trò quan trọng trong việc nâng cao bảo mật hệ thống tài chính, đặc biệt trong bối cảnh các mối đe dọa an ninh mạng ngày càng gia tăng và trở nên tinh vi hơn. Với các đặc tính nổi bật như tính phi tập trung, minh bạch, không thể thay đổi và khả năng tự động hóa thông qua hợp đồng thông minh, Blockchain mang lại một cách tiếp cận đột phá giúp giảm thiểu rủi ro gian lận, tối ưu hóa quy trình giao dịch, và nâng cao độ tin cậy của các hệ thống tài chính số.

Bên cạnh những lợi ích rõ rệt, nghiên cứu của chúng tôi cũng chỉ ra rằng việc ứng dụng Blockchain vào bảo mật tài chính vẫn còn gặp nhiều thách thức. Những khó khăn này bao gồm chi phí triển khai cao, khả năng mở rộng hệ thống còn hạn chế, tiêu tốn tài nguyên đáng kể (đặc biệt với các mô hình như Proof of Work), cũng như sự thiếu hụt khung pháp lý phù hợp để hỗ trợ sự phát triển bền vững của công nghệ này. Hơn nữa, trong một số trường hợp, tính ẩn danh của Blockchain có thể bị lợi dụng vào các hoạt động tài chính bất hợp pháp, gây khó khăn cho việc kiểm soát và giám sát của các cơ quan quản lý.

Tuy nhiên, với những tiến bộ không ngừng trong nghiên cứu và ứng dụng Blockchain, các giải pháp mới đang dần được phát triển nhằm giải quyết những hạn chế trên. Việc kết hợp Blockchain với các công nghệ tiên tiến khác như Trí tuệ nhân tạo (AI), Điện toán lượng tử và Mật mã học hiện đại có thể giúp tăng cường hiệu suất và tính bảo mật của hệ thống tài chính. Ngoài ra, sự hợp tác giữa các tổ chức tài chính, doanh nghiệp công nghệ và cơ quan quản lý là điều cần thiết để xây dựng một môi trường pháp lý phù hợp, thúc đẩy Blockchain phát triển theo hướng minh bạch, an toàn và bền vững.

Nhìn về tương lai, Blockchain không chỉ đơn thuần là một công cụ bảo mật mà còn có thể trở thành nền tảng cho một hệ sinh thái tài chính mới, nơi các giao dịch diễn ra nhanh chóng, chi phí thấp, và không cần sự can thiệp của các bên trung gian truyền thống. Các ứng dụng như thanh toán xuyên biên giới, hợp đồng thông minh, nhận diện danh tính số, và quản lý tài sản kỹ thuật số đều cho thấy tiềm năng to lớn của Blockchain trong việc thay đổi cách vận hành hệ thống tài chính toàn cầu.

Tóm lại, nghiên cứu này đã phân tích một cách toàn diện tác động của Blockchain đối với bảo mật tài chính, từ đó đưa ra những đánh giá về tiềm năng, thách thức cũng như định hướng phát triển trong tương lai. Mặc dù còn nhiều trở ngại cần giải quyết, nhưng với sự đầu tư mạnh mẽ từ các tổ chức tài chính và sự phát triển của công nghệ, Blockchain hứa hẹn sẽ trở thành một giải pháp cốt lõi giúp xây dựng một hệ thống tài chính an toàn, minh bạch và hiệu quả hơn trong kỷ nguyên số

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CÁC YẾU TỐ ẢNH HƯỞNG ĐẾN VIỆC ỨNG DỤNG TRÍ TUỆ NHÂN TẠO TRONG CÔNG TÁC KẾ TOÁN CỦA DOANH NGHIỆP NHỎ VÀ VỪA TẠI THÀNH PHỐ HỒ CHÍ MINH

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TÓM TẮT

Mục tiêu của nghiên cứu là tập trung đánh giá các yếu tố ảnh hưởng đến việc ứng dụng trí tuệ nhân tạo trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Thành phố Hồ Chí Minh. Nghiên cứu thu thập ý kiến thông qua bảng khảo sát: với mẫu 183 nhân viên kế toán đang làm việc ở doanh nghiệp nhỏ và vừa tại Thành phố Hồ Chí Minh. Tác giả đã sử dụng phương pháp nghiên cứu định lượng dựa trên phân tích độ tin cậy Cronbach's Alpha, kiểm định nhân tố khám phá (EFA) và phân tích hồi quy. Kết quả nghiên cứu cho thấy có 4 yếu tố ảnh hưởng đến việc ứng dụng trí tuệ nhân tạo trong công tác kế toán của doanh nghiệp nhỏ và vừa, bao gồm: kỳ vọng nỗ lực, ảnh hưởng xã hội, bảo mật an toàn dữ liệu và động lực thụ hưởng. Dựa vào kết quả nghiên cứu, tác giả đề xuất một số giải pháp nhằm thúc đẩy ứng dụng trí tuệ nhân tạo trong công tác kế toán tại các doanh nghiệp nhỏ và vừa.

Từ khóa: kế toán, trí tuệ nhân tạo, yếu tố ảnh hưởng.

I. ĐẶT VẤN ĐỀ

Trong kỷ nguyên số hiện nay, trí tuệ nhân tạo (Artificial Intelligence - AI) đã trở thành một trong những xu hướng nổi bật nhất trong lĩnh vực công nghệ. Khái niệm AI xuất hiện lần đầu tiên vào mùa hè năm 1956 khi được nhà khoa học máy tính người Mỹ John McCarthy đưa ra tại hội nghị Dartmouth để mô tả ngành khoa học kỹ thuật tạo ra máy móc thông minh có thể bắt chước hành vi của con người, có thể thực hiện các hoạt động đòi hỏi trí thông minh của con người, chẳng hạn như nhận thức thị giác, nhận dạng giọng nói, ra quyết định và dịch ngôn ngữ. Kể từ thời điểm đó, AI không ngừng phát triển và trở thành một phần không thể thiếu của cuộc sống hiện đại, hiện diện trong hầu hết các ngành nghề và mang lại những hiệu quả tích cực trong nhiều lĩnh vực trong đó có kế toán. AI giúp cho công việc của kế toán viên nhanh hơn, hiệu quả hơn; kế toán viên cũng như các công ty có thể giảm chi phí, tăng thêm giá trị cho ngành kế toán bằng cách chuyển trọng tâm khỏi các nhiệm vụ đơn điệu hiện có sang quyết định dựa trên dữ liệu và phân tích (A. R. Hasan, 2022). Tuy nhiên, AI cũng mang lại không ít những thách thức đối với người làm kế toán trong tương lai, những lo ngại về việc thay thế việc làm, bảo mật an toàn dữ liệu. Vẫn chưa biết liệu những thay đổi này có khuyến khích doanh nghiệp nhỏ và vừa tại Tp.HCM ứng dụng AI trong công tác kế toán hay không và những yếu tố chính nào ảnh hưởng đến việc ứng dụng AI trong công tác kế toán.

2. CƠ SỞ LÝ THUYẾT

2.1. Vai trò của AI trong công tác kế toán

Kế toán là quá trình thu thập, đo lường và xử lý các dữ liệu lịch sử theo các tiêu chuẩn đặt ra, cung cấp thông tin chi tiết cho các bên liên quan và nộp báo cáo với các cơ quan chính phủ về thuế hoặc các mục đích khác. Trước đây, công việc kế toán hoàn toàn phải làm bằng tay, phụ thuộc rất nhiều vào sự cẩn thận và tỉ mỉ của kế toán viên với rất nhiều sổ sách kế toán và bảng biểu theo một số tiêu chuẩn nhất định. Tuy nhiên trong những thập niên trở lại đây, trước sự phát triển mạnh mẽ về thành tựu khoa học kỹ thuật, công nghệ hiện đại, AI đã giúp kế toán viên cũng như các công ty có thể giảm chi phí kế toán, tăng thêm giá trị cho ngành kế toán bằng cách chuyển trọng tâm của kế toán khỏi các nhiệm vụ đơn điệu hiện có sang quyết định dựa trên dữ liệu và phân tích (A. R. Hasan, 2022).

Theo Wong, J. W. và Yap, K. H. A (2024) việc áp dụng AI đã trở nên phổ biến trong công tác kế toán, với các ứng dụng trong nhiều lĩnh vực bao gồm tài liệu điện tử, kiểm toán, thực hành thuế và các kỹ thuật phòng ngừa gian lận. Việc áp dụng AI trong công tác kế toán đã nhận được phản hồi tích cực như: nâng cao năng suất, hiệu quả và độ chính xác, vì nó cho phép các kế toán viên tập trung vào các nhiệm vụ quan trọng hơn bằng cách tự động hóa các quy trình nhập và quản lý dữ liệu. Ngoài ra, AI cung cấp khả năng phân tích và báo cáo dữ liệu theo thời gian thực, cho phép các doanh

nghiệp đưa ra quyết định nhanh chóng và sáng suốt. Với các hệ thống hỗ trợ, AI xử lý khối lượng dữ liệu lớn trong thời gian ngắn, những người ra quyết định có thể truy cập thông tin chính xác và cập nhật về tình hình tài chính của họ. Hơn nữa, AI có thể xác định các mô hình và xu hướng trong dữ liệu tài chính mà con người có thể bỏ qua, cung cấp những hiểu biết có giá trị về hoạt động và hiệu suất kinh doanh. Bằng cách tận dụng khả năng của AI, các doanh nghiệp có thể đưa ra quyết định sáng suốt hơn, tối ưu hóa hiệu suất tài chính và cải thiện dịch vụ khách hàng. Mặc dù vẫn còn lo ngại về khả năng thay thế lao động con người, việc tích hợp công nghệ AI vẫn là điều cần thiết để các doanh nghiệp duy trì tính cạnh tranh và đảm bảo tăng trưởng bền vững.

Bốn công ty kiểm toán hàng đầu thế giới (Big 4) được xem là các đơn vị tiên phong trong việc ứng dụng AI trong kế toán, kiểm toán và đã đạt được một số kết quả. Cụ thể: Deloitte đang triển khai các chatbot thông minh để hướng dẫn nhân viên thành thạo về các quy định, luật pháp, tiêu chuẩn kế toán và kiểm toán cũng như tài liệu chuyên ngành (Deloitte, 2018). PricewaterhouseCoopers (PwC) đã tạo ra robot GL.ai hợp tác với H2O.ai (một công ty ở thung lũng Silicon) để tích hợp công nghệ AI vào thực hành kế toán. Ernst & Young (EY) đã cho ra mắt một nền tảng trí tuệ nhân tạo mới mang tên EY.ai vào cuối năm 2023, đây là một nền tảng được kết hợp giữa năng lực của con người và AI, giúp khách hàng của EY tăng cường áp dụng AI, chuyển đổi doanh nghiệp thông qua việc áp dụng AI một cách tự tin và có trách nhiệm. Giải pháp "Dịch vụ thuế" của KPMG có thể tự động lập tờ khai thuế giá trị gia tăng và thuế thu nhập doanh nghiệp cũng như các bảng tính thuế bổ sung tại địa phương, phân tích xu hướng và phát hiện nhanh mọi sai sót, rủi ro hoặc những trường hợp bất thường (A. R. Hasan, 2022), KPMG đã phát triển K-analyzer: một chương trình phân tích thuế dựa trên công nghệ RPA (Robotic Process Automation - Tự động hóa quy trình bằng robot) có thể đánh giá hàng nghìn giao dịch trong khoảng thời gian vài phút. Tại Việt Nam, ngày 15/12/2023 công ty MISA ra mắt trợ lý trí tuệ nhân tạo AVA (Advanced Virtual Assistant) tích hợp miễn phí trên phần mềm MISA AMIS kế toán, đây là trợ lý ảo dành cho kế toán lần đầu tiên xuất hiện tại Việt Nam.

2.2. Các lý thuyết nền cho nghiên cứu

Khi nghiên cứu về ý định hành vi và hành vi sử dụng các công nghệ mới trong đó có AI, các nghiên cứu thường sử dụng lý thuyết mô hình chấp nhận và sử dụng công nghệ UTAUT (Unifed theory of acceptance and use of technology) được phát triển bởi Venkatesh và cộng sự năm 2003, UTAUT cho rằng kỳ vọng hiệu suất (Performance expectancy - PE), kỳ vọng nỗ lực (Effort expectancy - EE), ảnh hưởng xã hội (Social influence - SI) và điều kiện thuận lợi (Facilitating conditions - FC) dự đoán ý định hành vi, thông báo hành vi sử dụng. Năm 2012, Venkatesh và các cộng sự đã xây dựng phương pháp tiếp cận bổ sung cho mô hình ban đầu, mô hình UTAUT2 ra đời. UTAUT2 được tích hợp thêm các yếu tố: động lực thụ hưởng (Hedonic motivation - HM), chi phí và thói quen vào mô hình UTAUT gốc.

Nghiên cứu của Wong, J. W. và Yap, K. H. A (2024) tập trung làm rõ các yếu tố ảnh hưởng đến việc áp dụng trí tuệ nhân tạo trong kế toán tại các doanh nghiệp nhỏ và vừa ở Malaysia. Dữ liệu nghiên cứu được thu thập từ 196 người làm trong lĩnh vực kế toán và giám đốc doanh nghiệp. Kết quả nghiên cứu chỉ ra rằng khả năng tương thích, hỗ trợ của ban quản lý cấp cao, hỗ trợ chiến lược kinh doanh, nguồn lực tổ chức, cấu trúc thị trường kinh doanh, áp lực cạnh tranh và quy định của chính phủ tác động đáng kể đến việc áp dụng AI trong kế toán tại các doanh nghiệp nhỏ và vừa ở Malaysia.

Nghiên cứu của Hasan Al Wael, Wael Abdallah, Hasan Ghura và Amina Buallay (2023) về các yếu tố ảnh hưởng đến việc áp dụng trí tuệ nhân tạo trong lĩnh vực kế toán công ở Kuwait, dựa trên dữ liệu khảo sát ý kiến của 393 kế toán viên, kết quả nghiên cứu cho thấy văn hóa tổ chức, hỗ trợ pháp lý, tính hữu ích và tính dễ sử dụng có tác động tích cực đến việc áp dụng AI.

Ngoài ra, nghiên cứu của Oliver Gansser và C.S. Reich (2021) cho thấy những rủi ro về bảo mật an toàn dữ liệu (Safety security - SS) là một thành phần quan trọng đối với hành vi sử dụng, người dùng có thể lo lắng không chỉ về việc mất quyền kiểm soát dữ liệu hoặc việc bên thứ ba truy cập trái phép vào hệ thống mà còn là việc hệ thống bị lỗi và không hoạt động như mong muốn. Do đó, lo ngại về bảo mật an toàn dữ liệu là một yếu tố quan trọng trong hành vi sử dụng AI.

Một nghiên cứu của Ebrahim M. Mansour (2016) xác định các yếu tố ảnh hưởng đến việc áp dụng công nghệ máy tính trong quá trình kiểm toán ở Jordan. Nghiên cứu đã dựa trên bảng câu hỏi được gửi đến 200 kiểm toán viên để thu thập dữ liệu. Với tỷ lệ phản hồi trên 80%, kết quả phân tích thống kê cho thấy ý định áp dụng công nghệ máy tính trong quá trình kiểm toán của kiểm toán viên được thúc đẩy bởi cả kỳ vọng hiệu suất của kiểm toán viên và các vấn đề về điều kiện thuận lợi của công ty. Trong khi, kỳ vọng về nỗ lực và ảnh hưởng xã hội không có tác động đáng kể.

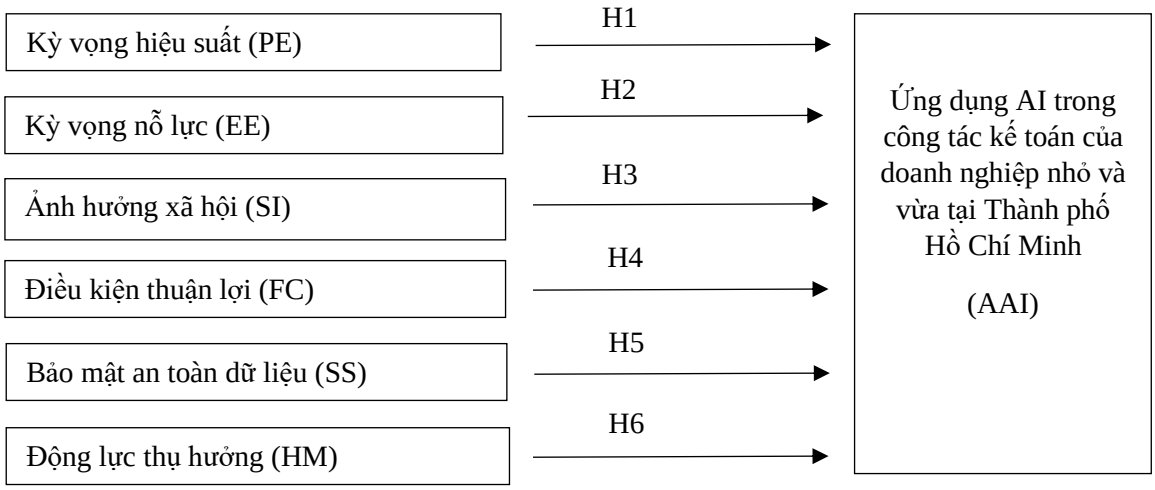
Tại Việt Nam, nghiên cứu của Nguyễn Hoàng Nam (2021) cho thấy có mối quan hệ giữa yếu tố kỳ vọng nỗ lực và điều kiện thuận lợi đối với hành vi ứng dụng công nghệ trong lĩnh vực kế toán, kiểm toán. Nghiên cứu của nhóm tác giả Phan Lê Trang, Phí Thị Diễm Hồng, Trần Nguyễn Thị Yến và Nguyễn Thị Hải Bình (2022) cho thấy có 4 nhóm nhân tố ảnh hưởng đến việc quyết định ứng dụng công nghệ thông tin trong công tác kế toán là khả năng kiểm soát nguồn lực bên trong doanh nghiệp, tính hữu ích của ứng dụng công nghệ thông tin, xu hướng chuẩn ứng dụng công nghệ thông tin bên ngoài doanh nghiệp và đặc điểm vượt trội của ứng dụng công nghệ thông tin.

3. PHƯƠNG PHÁP NGHIÊN CỨU

3.1. Mô hình nghiên cứu và giả thuyết nghiên cứu

Căn cứ vào kết quả ở phương pháp nghiên cứu định tính về các yếu tố tác động đến việc ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM, kế thừa kết quả của các nghiên cứu lý thuyết đi trước, tác giả đưa ra mô hình nghiên cứu chính thức. Trong đó, biến phụ thuộc là ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM và 6 biến độc lập bao gồm: kỳ vọng hiệu suất, kỳ vọng nỗ lực, ảnh hưởng xã hội, điều kiện thuận lợi, bảo mật an toàn dữ liệu và động lực thụ hưởng.

Hình 1: Mô hình nghiên cứu đề xuất



Nguồn: tác giả xây dựng, 2025)

Dựa theo mô hình nghiên cứu đề xuất, tác giả đặt ra 6 giả thiết nghiên cứu:

– *Kỳ vọng hiệu suất*: đề cập đến mức độ mà một cá nhân tin rằng việc sử dụng công cụ có thể hỗ trợ đạt được lợi ích trong hiệu suất công việc (Venkatesh, Morris, Davis & Davis, 2003). Kỳ vong hiệu suất có mối quan hệ đáng kể trong việc giải thích ý định hành vi và hành vi sử dụng đối với việc ứng dụng trí tuệ nhân tạo trong kế toán (Hasan Al Wael và cộng sự, 2023). Giả thuyết sau được đưa ra:

H1: Kỳ vọng hiệu suất có tác động cùng chiều (+) đến ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM.

– *Kỳ vọng nỗ lực*: là một trong những yếu tố quan trọng trong việc chấp nhận các công nghệ mới, được mô tả là sự đơn giản và tiện lợi khi sử dụng, là "mức độ dễ dàng liên quan đến việc sử dụng công cụ" (Venkatesh, Morris, Davis, & Davis, 2003). Giả thuyết sau được đưa ra:

H2: Kỳ vọng nỗ lực có tác động cùng chiều (+) đến ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM.

– *Ảnh hưởng xã hội*: có thể *được* hiểu là "mức độ mà một cá nhân nhận thức rằng những người quan trọng tin rằng họ nên sử dụng công cụ mới" (Venkatesh, Morris, Davis, & Davis, 2003). Giả thuyết sau được đưa ra:

H3: Ảnh hưởng xã hội có tác động cùng chiều (+) đến ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM.

– *Điều kiện thuận lợi*: là mức độ mà một cá nhân tin rằng có đủ nguồn lực để sử dụng công nghệ (Venkatesh, Morris, Davis, & Davis, 2003). Giả thuyết sau được đưa ra:

H4: Điều kiện thuận lợi có tác động cùng chiều (+) đến ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM.

– *Bảo mật an toàn dữ liệu*: đề cập đến việc người dùng lo lắng bị mất quyền kiểm soát dữ liệu, bên thứ ba truy cập trái phép vào hệ thống và hệ thống bị lỗi không hoạt động như mong muốn (Oliver Gansser và C.S. Reich, 2021). Giả thuyết sau được đưa ra:

H5: Bảo mật an toàn dữ liệu có tác động cùng chiều (+) đến ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM.

– *Động lực thụ hưởng*: được xác định là niềm vui hay sự sung sướng có được từ việc sử dụng công nghệ, có vai trò quan trọng trong việc xác định sự chấp nhận và sử dụng công nghệ (Venkatesh Viswanath, James Y. L. Thong và Xin Xu, 2012). Giả thuyết sau được đưa ra:

H6: Động lực thụ hưởng có tác động cùng chiều (+) đến ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM.

3.2. Phương pháp phân tích dữ liệu

Thang đo nghiên cứu được kế thừa từ nghiên cứu của Ebrahim M. Mansour (2016) và nghiên cứu của Oliver Gansser và C.S. Reich (2021), sau đó điều chỉnh hàm ý cho phù hợp với mô hình nghiên cứu. Sử dụng thang đo Likert 5 mức độ: (1) Hoàn toàn không đồng ý; (2) Không đồng ý; (3) Bình thường; (4) Đồng ý; (5) Hoàn toàn đồng ý để lượng hóa mối quan hệ giữa các yếu tố.

Bảng 1: Thang đo nghiên cứu

Thang đo	Biến quan sát	Mã hóa
Kỳ vọng hiệu suất (PE)	Việc sử dụng trí tuệ nhân tạo cho phép tôi hoàn thành công việc nhanh hơn.	PE1
	Việc sử dụng trí tuệ nhân tạo giúp nâng cao năng suất công việc của tôi.	PE2
	Việc sử dụng trí tuệ nhân tạo giúp cải thiện chất lượng công việc mà tôi thực hiện.	PE3
	Việc sử dụng trí tuệ nhân tạo cho phép tôi dành ít thời gian hơn cho các công việc hàng ngày.	PE4
	Việc sử dụng trí tuệ nhân tạo sẽ làm tăng cơ hội đạt được những điều quan trọng.	PE5
	Tôi thấy trí tuệ nhân tạo là một công cụ hữu ích trong công việc của tôi.	PE6
Kỳ vọng nỗ lực (EE)	Tôi thấy sự rõ ràng và dễ hiểu khi áp dụng trí tuệ nhân tạo trong công việc.	EE1
	Tôi có thể dễ dàng thực hiện những điều mình muốn khi sử dụng trí tuệ nhân tạo trong công việc.	EE2
	Đối với tôi, việc học cách vận hành trí tuệ nhân tạo là một quá trình dễ dàng.	EE3
	Trí tuệ nhân tạo là một công cụ dễ sử dụng.	EE4
Ảnh hưởng xã hội (SI)	Những cá nhân truyền cảm hứng cho hành vi của tôi nghĩ rằng tôi nên sử dụng trí tuệ nhân tạo trong công việc.	SI1
	Những người quan trọng với tôi tin rằng tôi nên sử dụng trí tuệ nhân tạo trong công việc.	SI2
	Những người mà tôi coi trọng ý kiến thường sử dụng các ứng dụng trí tuệ nhân tạo trong công việc.	SI3
	Công ty của tôi tạo điều kiện thuận lợi và ủng hộ việc ứng dụng trí tuệ nhân tạo trong công việc.	SI4
Điều kiện thuận lợi (FC)	Tôi có đủ kiến thức cần thiết để sử dụng trí tuệ nhân tạo trong công việc.	FC1
	Trang thiết bị, nguồn lực tài chính của công ty đáp ứng việc ứng dụng trí tuệ nhân tạo trong công việc.	FC2
	Tôi luôn nhận được sự hỗ trợ về mặt kỹ thuật để giải quyết những khó khăn của việc sử dụng trí tuệ nhân tạo.	FC3
Bảo mật an toàn dữ liệu (SS)	Vấn đề bảo mật dữ liệu, thông tin kế toán của công ty khi sử dụng trí tuệ nhân tạo trong công việc được đảm bảo an toàn.	SS1

	Việc bên thứ ba truy cập trái phép vào hệ thống đã được ngăn chặn.	SS2
	Hệ thống bị lỗi, không hoạt động như mong muốn đã được khắc phục và ngày càng hoàn thiện.	SS3
Động lực thụ hưởng (HM)	Việc sử dụng trí tuệ nhân tạo trong công việc kế toán sẽ rất thú vị.	HM1
	Việc sử dụng trí tuệ nhân tạo trong công việc kế toán sẽ mang lại cho tôi niềm vui.	HM2
	Tôi cảm thấy hào hứng khi sử dụng trí tuệ nhân tạo trong công việc.	HM3
Ứng dụng trí tuệ nhân tạo trong công tác kế toán (AAI)	Tôi sẽ ứng dụng trí tuệ nhân tạo vào công tác kế toán.	AAI1
	Tôi dự đoán ngành kế toán sẽ ứng dụng trí tuệ nhân tạo nhiều hơn trong tương lai gần.	AAI2
	Tôi sẽ giới thiệu những người khác ứng dụng trí tuệ nhân tạo vào công tác kế toán.	AAI3

Nguồn: tham khảo nghiên cứu của Ebrahim M. Mansour (2016); Oliver Gansser và C.S. Reich (2021)

Tác giả tiến hành thu thập dữ liệu khảo sát thông qua phần mềm Google biểu mẫu với 183 phiếu. Thời gian thực hiện khảo sát, thu thập dữ liệu sơ cấp từ tháng 11/2024 đến tháng 01/2025. Căn cứ số liệu khảo sát, bài viết sử dụng phần mềm SPSS 26 để phân tích độ tin cậy của các yếu tố cũng như các tiêu chí đo lường yếu tố, đồng thời áp dụng phương pháp thống kê để tổng hợp, so sánh nhằm lượng hóa mức độ ảnh hưởng của các yếu tố đến việc ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM.

4. KẾT QUẢ NGHIÊN CỨU

4.1. Phân tích thống kê mô tả

Trong tổng số 183 nhân viên kế toán đang làm việc ở các doanh nghiệp nhỏ và vừa tại Tp.HCM được khảo sát, về giới tính: nam chiếm 17.5%, nữ chiếm 82.5%. Độ tuổi từ 31-40 tuổi có 85 phiếu trả lời chiếm tỉ lệ cao nhất 46.4%. Về trình độ học vấn: đại học chiếm tỉ lệ chủ yếu 87.4% tương ứng 160 phiếu trả lời. Các đối tượng khảo sát có kinh nghiệm làm kế toán từ 5-10 năm chiếm tỉ lệ cao nhất 47.5%.

Bảng 2: Thống kê mô tả các biến quan sát trong nghiên cứu

Biến quan sát	Mẫu quan sát	Nhỏ nhất	Lớn nhất	Trung bình	Độ lệch chuẩn
PE1	183	3	5	4.27	.630
PE2	183	3	5	4.44	.633
PE3	183	2	5	4.21	.690
PE4	183	1	5	3.74	.992
PE5	183	2	5	4.10	.795
PE6	183	2	5	4.24	.739
EE1	183	2	5	3.92	.606
EE2	183	2	5	3.83	.743
EE3	183	2	5	3.78	.700
EE4	183	2	5	3.62	.752
SI1	183	2	5	3.86	.783
SI2	183	3	5	3.95	.600
SI3	183	2	5	3.79	.727
SI4	183	2	5	4.01	.625
FC1	183	1	5	3.80	.769
FC2	183	2	5	3.75	.637
FC3	183	2	5	3.77	.664
SS1	183	2	5	3.42	.873
SS2	183	2	5	3.72	.773
SS3	183	2	5	3.68	.763
HM1	183	2	5	4.07	.660
HM2	183	2	5	3.89	.596
HM3	183	2	5	3.93	.580

AAI1	183	2	5	3.98	.497
AAI2	183	2	5	3.97	.485
AAI3	183	2	5	4.05	.548

Nguồn: Tính toán của tác giả qua SPSS 26

4.2. Kết quả thang đo Cronbach's Alpha

Kết quả Cronbach's Alpha của thang đo các yếu tố ảnh hưởng đến việc ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM cho thấy tất cả các thành phần: kỳ vọng hiệu suất (PE), kỳ vọng nỗ lực (EE), ảnh hưởng xã hội (SI), điều kiện thuận lợi (FC), bảo mật an toàn dữ liệu (SS) và động lực thụ hưởng (HM) đều có hệ số tin cậy Cronbach's Alpha đạt chuẩn cho phép phân tích nhân tố khám phá (> 0.6). Tổng hợp kết quả thang đo được trình bày ở bảng 3:

Bảng 3: Kết quả kiểm định thang đo

STT	Nhóm biến	Số biến quan sát	Cronbach's Alpha
1	Kỳ vọng hiệu suất (PE)	6	0.857
2	Kỳ vọng nỗ lực (EE)	4	0.883
3	Ảnh hưởng xã hội (SI)	4	0.878
4	Điều kiện thuận lợi (FC)	3	0.801
5	Bảo mật an toàn dữ liệu (SS)	3	0.856
6	Động lực thụ hưởng (HM)	3	0.921
7	Áp dụng AI trong công tác kế toán (AAI)	3	0.896

Nguồn: Tính toán của tác giả qua SPSS 26

4.3 Phân tích nhân tố khám phá (EFA)

Phân tích EFA biến độc lập: kết quả phân tích khám phá đúng như mong đợi, có 6 yếu tố được rút ra ở ngay lần phân tích khám phá đầu tiên là: kỳ vọng hiệu suất, kỳ vọng nỗ lực, ảnh hưởng xã hội, điều kiện thuận lợi, bảo mật an toàn dữ liệu và động lực thụ hưởng. Tất cả các điều kiện về phân tích nhân tố khám phá đều đáp ứng, hệ số KMO = 0.848 > 0.5, Sig. = 0.000 < 0.05, chứng tỏ phân tích nhân tố để nhóm các biến lại với nhau là thích hợp và dữ liệu phù hợp cho việc phân tích nhân tố. Ngoài ra, các nhân tố có giá trị Eigenvalues = 1.075 > 1. Phương sai trích là 78.760% > 50% là đạt yêu cầu. Với phương pháp rút trích Principal components và phép quay Varimax, có 6 yếu tố được rút trích ra từ biến quan sát. Điều này cho thấy 6 yếu tố rút trích ra thể hiện khả năng giải thích được 78.760% sự thay đổi của biến phụ thuộc trong tổng thể.

Phân tích EFA biến phụ thuộc: trong bài nghiên cứu có 1 biến phụ thuộc: ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM, với 3 biến quan sát, kết quả phân tích EFA cho thấy tất cả các điều kiện về phân tích nhân tố khám phá đều đáp ứng, hệ số KMO = 0.738 > 0.5, Sig. = 0.000 < 0.05, giá trị trích Eigenvalues = 2.483 > 1 và phương sai trích đạt 82.769%.

4.4. Phân tích hồi quy bội

Kết quả kiểm định ANOVA (bảng 4) cho thấy kiểm định trị thống kê F với giá trị Sig. = 0.000 < 0.05 cho thấy mô hình hồi quy tuyến tính bội xây dựng phù hợp với dữ liệu đã thu thập.

Bảng 4: Phân tích phương sai ANOVA

Mô hình		Tổng các độ lệch bình phương	df	Trung bình các độ lệch bình phương	Kiểm định F	Sig.
1	Hồi quy	37.333	6	6.222	49.199	.000[b]
	Phần dư	22.259	176	.126		
	Tổng	59.592	182			

Nguồn: Tính toán của tác giả qua SPSS 26

Bảng 5 cho thấy hệ số R2 hiệu chỉnh = 0.614 có nghĩa các biến độc lập trên giải thích được 61,4% cho biến phụ thuộc. Ngoài ra hệ số Durbin–Watson = 1.929 < 3 nên kết quả không vi phạm giả định tự tương quan chuỗi bậc nhất.

Bảng 5: Kiểm định Durbin–Watson

Mô hình	R	R2	R2 hiệu chỉnh	Sai số ước lượng	Hệ số Durbin–Watson
1	.792[a]	.626	.614	.35563	1.929

Nguồn: Tính toán của tác giả qua SPSS 26

Bảng 6: Kết quả hồi quy

Mô hình		Hệ số chưa chuẩn hóa		Hệ số đã chuẩn hóa	T	Sig.	Thống kê đa cộng tuyến	
		B	Sai số chuẩn	Beta			Tolerance	VIF
1	Hằng số	.461	.242		1.908	.058		
	PE	.081	.067	.081	1.206	.230	.467	2.142
	EE	.183	.062	.193	2.929	.004	.588	1.812
	SI	.149	.063	.166	2.375	.019	.535	1.846
	FC	.077	.063	.079	1.236	.218	.517	1.934
	SS	.077	.035	.110	2.218	.028	.867	1.154
	HM	.324	.054	.414	5.973	.000	.642	1.538
Biến phụ thuộc: AAI								

Nguồn: Tính toán của tác giả qua SPSS 26

Kết quả hồi quy ở bảng 6 cho thấy: có giá trị Sig. tương ứng với các biến EE, SI, SS, HM < 0.05 và VIF lần lượt < 2 nên hiện tượng đa cộng tuyến trong mô hình không đáng kể. Như vậy với mức ý nghĩa 5% có thể kết luận biến độc lập: kỳ vọng nỗ lực (EE), ảnh hưởng xã hội (SI), bảo mật an toàn dữ liệu (SS) và động lực thụ hưởng (HM) có ảnh hưởng đến biến phụ thuộc "ứng dụng AI trong công tác kế toán của doanh nghiệp nhỏ và vừa tại Tp.HCM" (AAI). Loại biến kỳ vọng hiệu suất (PE) và điều kiện thuận lợi (FC) vì có giá trị Sig. > 0.05. Phương trình hồi quy được thể hiện dưới dạng sau:

$$AAI = 0.414 \times HM + 0.193 \times EE + 0.166 \times SI + 0.110 \times SS$$

5. KẾT LUẬN VÀ HÀM Ý QUẢN TRỊ

Kết quả nghiên cứu cho thấy có mối quan hệ giữa yếu tố: kỳ vọng nỗ lực, ảnh hưởng xã hội, bảo mật an toàn dữ liệu và động lực thụ hưởng đối với hành vi ứng dụng AI trong công tác kế toán của của doanh nghiệp nhỏ và vừa tại Tp.HCM. Trong khi đó, yếu tố điều kiện thuận lợi và kỳ vọng hiệu suất không có ý nghĩa thống kê, điều này có thể được giải thích: khi hiện nay cơ sở hạ tầng, trang thiết bị của doanh nghiệp nhỏ và vừa được trang bị đầy đủ bên cạnh nguồn lực tài chính và nguồn nhân lực đáp ứng các yêu cầu của công việc; các phần mềm kế toán đang đáp ứng được nhu cầu xử lý dữ liệu của doanh nghiệp nhỏ và vừa. Từ kết quả nghiên cứu cùng với những cơ hội và lợi ích do AI mang lại, quá trình số hóa lĩnh vực kế toán là một xu thế tất yếu, cần tập trung vào các giải pháp sau:

– Đối với yếu tố kỳ vọng nỗ lực: kế toán viên phải không ngừng học hỏi nhằm phát triển kỹ năng chuyên môn kết hợp với kỹ năng công nghệ thông tin để đáp ứng yêu cầu trong công việc, thông qua việc chủ động tìm kiếm, tham gia các khóa học góp phần cải thiện kỹ năng sử dụng AI trong công việc.

– Đối với yếu tố ảnh hưởng xã hội: chính là mức độ tác động của những người có ảnh hưởng, có mối liên hệ trực tiếp đến kế toán viên như: cơ sở giáo dục đào tạo, đồng nghiệp, công ty cung cấp phần mềm kế toán, cơ quan quản lý nhà nước, … Việc một kế toán viên nhận thấy các đồng nghiệp trong cùng công việc sử dụng AI sẽ khiến họ cảm thấy cần tiếp cận và sử dụng AI trong công việc. Các cơ sở giáo dục cần xem xét điều chỉnh và đổi mới chương trình giảng dạy và giáo trình đào tạo chuyên môn của mình trong bối cảnh ứng dụng AI trong công tác kế toán để đáp ứng nhu cầu và kỳ vọng của nhà tuyển dụng từ sinh viên tốt nghiệp. Các cơ sở giáo dục không chỉ tập trung vào việc giảng dạy hệ thống thông tin kế toán truyền thống mà còn phải tập trung vào phân tích dữ liệu, quản lý thông tin và công nghệ cùng nhiều thứ khác, dựa trên những ý kiến đóng góp từ các chuyên gia và nhà sư phạm từ nhiều lĩnh vực khác nhau bao gồm hệ thống thông tin, thống kê, khoa học máy tính và kỹ thuật, các vấn đề đạo đức và dữ liệu lớn. Bên cạnh đó, Chính phủ cần đưa ra chính sách và chiến lược quốc gia về triển khai công nghệ AI, đẩy mạnh xây dựng cơ sở hạ tầng công nghệ. Sự cần thiết của cơ quan quản lý giám sát sự phát triển của AI liên quan đến ứng dụng trong công tác kế toán. Tăng cường năng lực của cơ quan quản lý về kế toán, đẩy mạnh hoạt động của các tổ chức nghề nghiệp như: Hội kiểm toán viên hành nghề Việt Nam (VACPA), Hiệp hội kế toán và kiểm toán Việt Nam (VAA), Hội kế toán hành nghề Việt Nam (VICA), … và hợp tác quốc tế, kết hợp cùng các công ty cung cấp phần mềm thường xuyên tổ chức các buổi tập huấn, giới thiệu

những ứng dụng mới của AI mang lại khi được tích hợp sử dụng trong công tác kế toán.

– Đối với yếu tố bảo mật an toàn dữ liệu: doanh nghiệp cần nhận thấy những lợi ích mà ứng dụng công nghệ AI mang lại khi áp dụng, từ đó có kế hoạch chủ động đầu tư trang thiết bị, công nghệ thông tin đồng bộ phù hợp nhu cầu quản trị và mục tiêu chiến lược của mình, bên cạnh việc tìm kiếm và phát triển các giải pháp an toàn thông tin, bảo mật thông tin và bảo mật dữ liệu.

– Đối với yếu tố động lực thụ hưởng: khi cảm nhận được sự hứng thú, thỏa mãn thông qua việc ứng dụng AI trong công việc, kế toán viên sẽ tích cực sử dụng AI hơn. Vì vậy các công ty cung cấp giải pháp về AI cần tập trung vào các thuộc tính và tính năng mới nhằm gia tăng các trải nghiệm cho kế toán viên trong quá trình làm việc của họ.

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QUẢN TRỊ AI CÓ TRÁCH NHIỆM: DOANH NGHIỆP PHÁT TRIỂN BỀN VỮNG TRONG KỶ NGUYÊN AI

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TÓM TẮT

Trí tuệ nhân tạo (AI) đang trở thành một yếu tố quan trọng trong chiến lược chuyển đổi số của doanh nghiệp, nâng cao hiệu suất, tối ưu hóa quy trình, tạo lợi thế cạnh tranh. Tuy nhiên, sự phổ biến nhanh chóng của AI cũng đặt ra thách thức về tính bền vững, quản trị rủi ro và phù hợp với mục tiêu dài hạn. Dựa trên tổng quan các nghiên cứu, bài viết phân tích hiện trạng ứng dụng AI, chỉ ra sự thiếu nhất quán trong quản trị AI, các rủi ro đạo đức, sự mất kiểm soát dữ liệu và khoảng cách giữa công nghệ với mục tiêu kinh doanh. Bài viết đề xuất rằng việc tích hợp AI vào doanh nghiệp cần một lộ trình và framework rõ ràng, giúp đồng bộ hóa (alignment) AI với chiến lược, bảo đảm AI trở thành công cụ bền vững thay vì gây xáo trộn. Trọng tâm là Quản trị AI có trách nhiệm (Responsible AI Governance), đòi hỏi hệ thống quản lý chặt chẽ, truyền thông nội bộ hiệu quả, nâng cao nhận thức về trách nhiệm, tính minh bạch và kiểm soát AI. Thông qua các nguyên tắc và mô hình quản trị AI có trách nhiệm, nghiên cứu hướng đến hỗ trợ doanh nghiệp phát triển dài hạn trong kỷ nguyên số.

Từ khóa: AI, phát triển bền vững, quản trị AI có trách nhiệm

1. GIỚI THIỆU

Trong bối cảnh chuyển đổi số toàn cầu, trí tuệ nhân tạo (AI) không chỉ là một công nghệ hỗ trợ mà còn đóng vai trò là động lực thúc đẩy đổi mới và tái cấu trúc doanh nghiệp. AI đã và đang thay đổi cách thức vận hành của doanh nghiệp trong nhiều lĩnh vực, từ tự động hóa quy trình kinh doanh, phân tích dữ liệu nâng cao, đến cải thiện trải nghiệm khách hàng (Himeur et al., 2023; Oyeniyi et al., 2024; Paschek et al., 2017). Theo nghiên cứu của McKinsey & Company (2020), hơn 50% doanh nghiệp lớn trên thế giới đã thử nghiệm hoặc triển khai các hệ thống AI vào hoạt động vận hành, trong đó có AI trong phát triển sản phẩm và dịch vụ, sản xuất, quản trị nguồn nhân lực, tiếp thị và bán hàng… (McKinsey & Company, 2020)

Tuy nhiên, mặc dù AI mang lại những cơ hội đột phá, việc triển khai AI trong thực tế không đơn thuần chỉ là một quyết định công nghệ, mà đòi hỏi một chiến lược quản trị tổng thể để đảm bảo AI được ứng dụng một cách có trách nhiệm và bền vững. Những doanh nghiệp chỉ tập trung vào tốc độ triển khai AI mà không tính đến tác động dài hạn thường gặp phải các rủi ro như tính thiên lệch trong mô hình (Mittermaier et al., 2023), vi phạm quyền riêng tư dữ liệu (Curzon et al., 2021), mất kiểm soát thuật toán (Yampolskiy, 2024), và sự mất kết nối với mục tiêu chiến lược của tổ chức (Vayyavur, 2024).

Sự thiếu nhất quán trong quản trị AI hiện nay dẫn đến nhiều mâu thuẫn giữa lợi ích công nghệ và trách nhiệm xã hội, đặt doanh nghiệp vào tình thế tiến thoái lưỡng nan: Làm sao để vừa tận dụng được tiềm năng AI, vừa đảm bảo rằng AI không gây ra các rủi ro về đạo đức, pháp lý và vận hành? Việc thiếu một khung quản trị AI có trách nhiệm (Responsible AI Governance) không chỉ khiến doanh nghiệp gặp phải những rủi ro pháp lý mà còn làm xói mòn lòng tin của khách hàng, đối tác và công chúng (Aldboush & Ferdous, 2023; Peukert & Kloker, 2020). Vậy nên, nghiên cứu này lập luận rằng việc ứng dụng AI trong doanh nghiệp không thể chỉ dựa trên các quyết định công nghệ đơn lẻ, mà cần có một lộ trình tích hợp AI vào chiến lược tổ chức, đảm bảo AI phục vụ mục tiêu dài hạn thay vì trở thành yếu tố làm gián đoạn hoặc gây tổn hại đến doanh nghiệp.

Nghiên cứu này nhằm: (1) Phân tích thực trạng ứng dụng AI trong doanh nghiệp, chỉ ra những rủi ro và thách thức trong việc triển khai AI mà không có chiến lược quản trị phù hợp. (2) Đề xuất mô hình quản trị AI có trách nhiệm, giúp doanh nghiệp cân bằng giữa đổi mới công nghệ và trách nhiệm xã hội, đảm bảo AI không chỉ là một công cụ gia tăng hiệu suất mà còn tạo ra giá trị bền vững. (3) Nhấn mạnh sự cần thiết của truyền thông nội bộ về AI, giúp doanh nghiệp xây dựng một văn hóa AI minh bạch, có trách nhiệm và đảm bảo sự đồng thuận giữa các bên liên quan.

Phần tiếp theo của bài nghiên cứu có cấu trúc như sau: trình bày tổng quan về các nghiên cứu trước đây liên quan đến thực trạng ứng dụng AI trong doanh nghiệp, bao gồm những lợi ích và rủi ro đi kèm, việc quản trị AI có trách nhiệm; đề xuất mô hình quản trị AI có trách nhiệm và cách thức tích hợp AI vào chiến lược tổ chức; thảo luận vai trò của truyền thông nội bộ trong việc triển khai AI bền vững. Cuối cùng, tổng kết những đóng góp của nghiên cứu và đưa ra các khuyến nghị cho doanh nghiệp trong việc áp dụng AI một cách có trách nhiệm và hiệu quả.

2. TỔNG QUAN NGHIÊN CỨU VỀ AI VÀ QUẢN TRỊ AI CÓ TRÁCH NHIỆM

2.1. Xu hướng ứng dụng AI trong doanh nghiệp

Trong hơn một thập kỷ qua, AI đã trở thành một trong những công nghệ cốt lõi trong chuyển đổi số của doanh nghiệp. AI không chỉ dừng lại ở các mô hình phân tích dữ liệu nâng cao mà còn được tích hợp vào các hệ thống ra quyết định tự động, tối ưu hóa quy trình kinh doanh và phát triển sản phẩm và dịch vụ thông minh (Dear, 2019; McKinsey & Company, 2020; Paschek, 2020). Theo báo cáo của PwC (2017), AI có tiềm năng đóng góp 15,7 nghìn tỷ USD vào nền kinh tế toàn cầu vào năm 2030, với các lĩnh vực như tài chính, y tế, sản xuất, vận tải… truyền thông (PwC, 2017).

Các tổ chức trên toàn cầu đang tích cực ứng dụng AI vào nhiều lĩnh vực, từ vận hành nội bộ đến tương tác với khách hàng, tạo ra sự thay đổi sâu rộng trong cách doanh nghiệp hoạt động và cạnh tranh. Tiêu biểu, trong tự động hóa quy trình và tối ưu hóa vận hành, AI đang thay thế hoặc hỗ trợ các nhiệm vụ lặp đi lặp lại, giúp doanh nghiệp tiết kiệm thời gian, chi phí nhân lực và nâng cao năng suất. Các công nghệ như RPA (Robotic Process Automation) được sử dụng để xử lý hóa đơn, quản lý dữ liệu khách hàng, hoặc giám sát chuỗi cung ứng mà không cần can thiệp của con người (Ribeiro et al., 2021). Ngoài ra, về trợ lý ảo và dịch vụ khách hàng thông minh, các hệ thống chatbot và trợ lý ảo sử dụng AI xử lý ngôn ngữ tự nhiên (NLP) đang được triển khai rộng rãi trong chăm sóc khách hàng. Chatbots AI có thể trả lời câu hỏi, giải quyết khiếu nại và hỗ trợ giao dịch 24/7, giúp doanh nghiệp nâng cao trải nghiệm khách hàng và giảm áp lực cho nhân viên hỗ trợ (Daqar & Smoudy, 2019). Đặc biệt, xoay quanh phân tích dữ liệu và dự báo xu hướng, AI giúp doanh nghiệp phân tích lượng dữ liệu khổng lồ để đưa ra dự đoán chính xác hơn về hành vi khách hàng, xu hướng thị trường, và rủi ro tài chính. Ngành tài chính, bảo hiểm, và thương mại điện tử đều đang sử dụng AI để phát hiện gian lận, tối ưu hóa chiến dịch marketing và dự báo nhu cầu sản phẩm. Hơn nữa, AI còn được ứng dụng trong tuyển dụng và quản lý nhân sự. Các doanh nghiệp đang sử dụng AI để tuyển dụng và đánh giá nhân viên thông qua việc phân tích CV, hồ sơ ứng viên, hoặc thậm chí đánh giá tiềm năng dựa trên dữ liệu hành vi (Azzou & Talei, 2024). AI cũng được sử dụng để cá nhân hóa chương trình đào tạo và hỗ trợ nhân viên phát triển kỹ năng (Chassignol et al., 2018). Về sản xuất và chuỗi cung ứng, AI giúp doanh nghiệp tối ưu hóa chuỗi cung ứng, từ việc dự báo nhu cầu hàng hóa, tự động hóa quy trình kiểm kê kho, đến giám sát chất lượng sản phẩm bằng AI thị giác máy tính. Các nhà máy thông minh (smart factories) ứng dụng AI để giảm thiểu lãng phí nguyên liệu, nâng cao hiệu suất sản xuất và phát hiện lỗi sản phẩm sớm hơn con người (Kim et al., 2022). Và cuối cùng, không thể quên vai trò của AI trong sáng tạo nội dung và tiếp thị số. AI đang thay đổi cách tiếp thị và sáng tạo nội dung, từ việc cá nhân hóa quảng cáo, tự động hóa chiến dịch marketing, đến tạo ra nội dung bằng AI. Các công cụ AI như ChatGPT, DALL-E hay Midjourney đang hỗ trợ các doanh nghiệp sản xuất nội dung số, thiết kế hình ảnh, và phát triển chiến dịch truyền thông một cách nhanh chóng và hiệu quả (Senyapar, 2024).

Trong những năm tới, AI sẽ tiếp tục phát triển mạnh mẽ, không chỉ hỗ trợ doanh nghiệp trong các tác vụ cụ thể mà còn giúp ra quyết định chiến lược, phát triển mô hình kinh doanh mới, và tối ưu hóa toàn bộ hệ thống vận hành. Tuy nhiên, cùng với sự phát triển đó, doanh nghiệp cũng cần xây dựng chiến lược quản trị AI có trách nhiệm, đảm bảo AI mang lại giá trị bền vững thay vì chỉ là công cụ chạy theo xu hướng.

2.2 Các rủi ro và thách thức

Mặc dù AI mang lại nhiều lợi ích, doanh nghiệp cũng phải đối mặt với một loạt thách thức trong quá trình triển khai AI, bao gồm: Thiếu tính minh bạch và khả năng giải thích (Explainability & Transparency) (Došilović et al., 2018; Larsson & Heintz, 2020). Một trong những thách thức lớn nhất của AI trong doanh nghiệp là tính "hộp đen" (black-box nature), khi thuật toán đưa ra quyết định nhưng con người không thể dễ dàng hiểu được cơ sở lập luận của nó (Castelvecchi, 2016). Điều này đặc biệt nguy hiểm trong các lĩnh vực như tài chính (quyết định cấp tín dụng), y tế (chẩn đoán bệnh) hay nhân sự (đánh giá năng lực nhân viên), nơi mà sự thiếu minh bạch có thể dẫn đến sai lầm nghiêm trọng hoặc thiên lệch. Ngoài ra, các nhà nghiên cứu và thực thi AI còn lo ngại đến tính thiên lệch và công bằng trong AI (Bias & Fairness Issues) (Ferrara, 2023). AI có thể vô tình củng cố các thiên lệch xã hội, giới tính hoặc sắc tộc, nếu dữ liệu

huấn luyện không được kiểm soát tốt. Ví dụ, các hệ thống tuyển dụng AI của Amazon đã từng bị chỉ trích vì thiên vị nam giới trong đánh giá ứng viên, do thuật toán được đào tạo trên dữ liệu lịch sử tuyển dụng có xu hướng ưu tiên nam giới (Dastin, 2022). Bên cạnh đó, các chuyên gia và công chúng còn đặc biệt lo ngại Quản lý dữ liệu và quyền riêng tư (Data Governance & Privacy) (Richard & Schlick, 2024). AI phụ thuộc vào khối lượng dữ liệu khổng lồ, nhưng việc thu thập và sử dụng dữ liệu này có thể vi phạm quyền riêng tư cá nhân nếu không được kiểm soát tốt. Việc bảo vệ dữ liệu khách hàng, đảm bảo quyền kiểm soát dữ liệu của người dùng và tuân thủ quy định pháp lý là những yếu tố mà doanh nghiệp cần cân nhắc khi triển khai AI.

Một vấn đề phổ biến khác dẫn đến rủi ro trong việc áp dụng AI tại các tổ chức và doanh nghiệp là việc AI thường được triển khai một cách rời rạc, không gắn kết với chiến lược tổ chức, dẫn đến lãng phí nguồn lực và không mang lại giá trị thực sự (Vayyavur, 2024). Theo nghiên cứu của Vayyavur (2024), doanh nghiệp đầu tư mạnh vào AI nhưng lại không có lộ trình rõ ràng, khiến AI trở thành một dự án thí điểm thất bại thay vì một công cụ hỗ trợ bền vững.

3. ĐỀ XUẤT MÔ HÌNH QUẢN TRỊ AI CÓ TRÁCH NHIỆM TRONG DOANH NGHIỆP

3.1. Sự cần thiết của mô hình quản trị ai có trách nhiệm

Trí tuệ nhân tạo (AI) không còn là một công nghệ phụ trợ mà đã trở thành một phần cốt lõi của doanh nghiệp trong nhiều lĩnh vực. Tuy nhiên, sự phát triển nhanh chóng của AI đang đặt doanh nghiệp trước những rủi ro chưa từng có: từ việc thuật toán ra quyết định thiếu minh bạch, thiên lệch dữ liệu, đến vi phạm quyền riêng tư và đạo đức kinh doanh (Haenlein, 2022). Mặc dù nhiều tổ chức đã triển khai AI để tối ưu hóa quy trình, nhưng sự thiếu vắng một mô hình quản trị AI có trách nhiệm khiến nhiều doanh nghiệp đối mặt với các vấn đề pháp lý, tổn hại danh tiếng và mất niềm tin từ khách hàng (Cath, 2018). Những công ty chỉ tập trung vào tính năng và hiệu suất của AI mà bỏ qua khía cạnh quản trị đang dần nhận ra rằng AI không được kiểm soát chặt chẽ có thể trở thành một con dao hai lưỡi. Vậy, làm thế nào để doanh nghiệp vừa tận dụng được sức mạnh của AI vừa đảm bảo rằng nó phù hợp với mục tiêu chiến lược và giá trị đạo đức? Câu trả lời nằm ở một mô hình quản trị AI có trách nhiệm, giúp doanh nghiệp điều chỉnh việc sử dụng AI sao cho minh bạch, công bằng, có trách nhiệm và tuân thủ đạo đức kinh doanh (Dignum, 2023).

Bảy nguyên tắc cốt lõi của quản trị AI có trách nhiệm được đề xuất nhằm đảm bảo sự phát triển và triển khai AI theo hướng đạo đức và bền vững (Papagiannidis et al., 2025): Trách nhiệm giải trình (Accountability) là yếu tố quan trọng đầu tiên, yêu cầu các hệ thống AI phải có cơ chế giám sát rõ ràng, xác định trách nhiệm ở từng giai đoạn triển khai để đảm bảo tính minh bạch và khả năng kiểm tra. Đa dạng, không phân biệt đối xử và công bằng (Diversity, nondiscrimination and fairness) là nguyên tắc nhằm ngăn chặn thiên lệch trong mô hình AI, đảm bảo quyền tiếp cận công bằng và không để AI đưa ra các quyết định mang tính phân biệt đối xử. Nâng cao vai trò con người và giám sát (Human agency and oversight) nhấn mạnh rằng AI phải hỗ trợ thay vì thay thế con người, đồng thời luôn có sự kiểm soát để tránh tình trạng phụ thuộc hoàn toàn vào quyết định tự động. Quyền riêng tư và quản trị dữ liệu (Privacy and data governance) là yếu tố thiết yếu để bảo vệ thông tin người dùng, đòi hỏi các chính sách quản lý dữ liệu minh bạch, đảm bảo rằng việc thu thập và xử lý dữ liệu phải có sự đồng ý và kiểm soát hợp lý. Độ an toàn và khả năng chống chịu về mặt kỹ thuật (Technical robustness and safety) yêu cầu các hệ thống AI phải vận hành một cách đáng tin cậy, có cơ chế bảo vệ trước các cuộc tấn công và rủi ro công nghệ. Tính minh bạch (Transparency) đóng vai trò then chốt trong việc xây dựng niềm tin, khi các quyết định của AI cần phải được giải thích một cách rõ ràng, giúp người dùng hiểu được cách thức AI đưa ra kết luận. Cuối cùng, phát triển AI vì lợi ích xã hội và môi trường (Social and environmental well-being) đảm bảo rằng AI không chỉ phục vụ mục tiêu thương mại mà còn đóng góp tích cực cho xã hội, giảm thiểu tác động tiêu cực đến môi trường. Những nguyên tắc này không chỉ giúp định hình một hệ thống AI có trách nhiệm mà còn giúp các tổ chức áp dụng AI theo cách phù hợp với giá trị đạo đức và lợi ích chung của xã hội.

3.2. Đề xuất mô hình quản trị ai có trách nhiệm

Dựa trên các nguyên tắc trên và các nghiên cứu trước xoay quang quản trị AI có trách nhiệm, nghiên cứu này đề xuất mô hình quản trị AI có trách nhiệm trong doanh nghiệp cần bao gồm ba cấp độ chính: Cấp độ chiến lược (Strategic Level); Cấp độ tổ chức (Organizational Level), và Cấp độ vận hành (Operational Level).

Đầu tiên, các quyết định mang tính chiến lược liên quan trực tiếp đến tầm nhìn và chiến lược tổng thể của tổ chức nên chúng thường có định hướng dài hạn. Do đó, quản trị AI có trách nhiệm ở cấp độ chiến lược (Strategic Level) là: định hướng toàn bộ tổ chức, xác định hoặc điều chỉnh các nguyên tắc đạo đức quan trọng, đóng vai trò nền tảng trong

việc dẫn dắt toàn bộ tổ chức trong quá trình phát triển và ứng dụng AI (Brendel et al., 2021). Nói cách khác, ở cấp độ này, hội đồng quản trị và lãnh đạo doanh nghiệp cần xác định AI phục vụ cho mục tiêu chiến lược cụ thể nào của doanh nghiệp, rồi xây dựng chính sách quản trị AI có trách nhiệm phù hợp, kèm quy định rõ về cách thu thập dữ liệu, sử dụng thuật toán và quản trị rủi ro. Từ đó mới có thể tích hợp và sử dụng AI hiệu quả, nhất quán, đảm bảo lợi ích tổ chức các bên liên quan, sự phát triển bền vững của toàn xã hội.

Tiếp theo, ở cấp độ tổ chức (Organizational Level), căn cứ trên đề xuất của Papagiannidis et al. (2025) về thực tiễn cấu trúc (structural practices), là quy trình và phương thức có tổ chức để xác định quyền và trách nhiệm của các bên liên quan trong phát triển và triển khai AI, nghiên cứu này đề xuất việc thiết lập các phòng ban chuyên trách về AI (Dignum, 2020), đảm bảo sự phối hợp giữa đội ngũ công nghệ, pháp lý và quản lý rủi ro. Việc này đảm bảo sự phối hợp xuyên suốt và kịp thời giữa nhiều mảng chuyên môn. Gắn liền với điều đó, doanh nghiệp cần có cơ chế phối hợp liên chức năng cross-functional teamwork giữa đội ngũ kỹ thuật, marketing, tài chính và cả nhân sự… để góp phần giúp AI được triển khai một cách đồng bộ, phản ánh đúng nhu cầu của từng bộ phận (Dignum, 2020; Papagiannidis et al., 2025; Ying et al., 2021).

Cuối cùng, ở cấp độ Vận hành (Operational Level), doanh nghiệp cần hướng dẫn trách nhiệm và quy trình rõ ràng (Brendel et al., 2021). Các nhóm phát triển AI (data scientists, machine learning engineers) và nhân viên trực tiếp sử dụng AI (operations, customer service) phải được đào tạo về quy trình vận hành, bảo mật dữ liệu và nguyên tắc đạo đức. Việc huấn luyện các bên liên quan này cũng được nhấn mạnh trong nghiên cứu của Papagiannidis et al. (2025) như một hoạt động cần thiết tại tổ chức và doanh nghiệp khi quản trị AI có chiến lược. Và cuối cùng nhưng không kém phần quan trọng: cần kiểm tra, đánh giá liên tục. Do tính chất "học" không ngừng của AI, doanh nghiệp cần xây dựng quy trình kiểm tra định kỳ, cập nhật thuật toán, mô hình, và đánh giá lại dữ liệu huấn luyện để kịp thời phát hiện sai lệch, bias (Davis et al., 2023; Feng et al., 2022).

4. THẢO LUẬN VÀ HÀM Ý THỰC TIỄN CHO DOANH NGHIỆP

4.1. Quản trị AI có trách nhiệm: Không chỉ là yêu cầu đạo đức, mà là chiến lược tất yếu

Trong những phần trước, nghiên cứu đã chỉ ra rằng việc áp dụng AI không thể tách rời khỏi chiến lược tổng thể của doanh nghiệp. Nếu AI không được kiểm soát và quản trị đúng cách, nó không chỉ mang đến rủi ro pháp lý, mà còn gây tổn hại đến lòng tin của khách hàng và cộng đồng. Quản trị AI có trách nhiệm (Responsible AI Governance) không đơn thuần là một cam kết đạo đức, mà đã trở thành một yếu tố chiến lược tất yếu giúp doanh nghiệp tồn tại và phát triển trong kỷ nguyên số.

Sự thiếu vắng một mô hình quản trị AI phù hợp có thể khiến doanh nghiệp phải đối mặt với các vụ kiện pháp lý và lệnh trừng phạt từ cơ quan quản lý, đặc biệt trong bối cảnh nhiều quốc gia đang siết chặt quy định về AI, như Đạo luật AI của EU. Ngoài ra, còn có rủi ro từ việc mất niềm tin từ khách hàng và đối tác, do AI thiếu minh bạch hoặc có thiên lệch, gây tổn hại đến hình ảnh doanh nghiệp. Lãng phí nguồn lực, khi AI được triển khai một cách rời rạc, không gắn kết với chiến lược dài hạn của tổ chức. Do đó, doanh nghiệp cần chủ động xây dựng mô hình quản trị AI có trách nhiệm, thay vì chờ đợi quy định từ chính phủ hoặc bị động phản ứng khi xảy ra khủng hoảng.

4.2. Các bước thực hiện quản trị AI có trách nhiệm

Dựa trên phân tích ở các phần trước, nghiên cứu này đề xuất một số hàm ý thực tiễn giúp doanh nghiệp xây dựng hệ thống quản trị AI hiệu quả: 1. Xây dựng một chiến lược AI toàn diện. Trước khi triển khai AI, doanh nghiệp cần xác định rõ AI sẽ mang lại giá trị gì? Nó có thực sự phù hợp với mô hình kinh doanh không? AI không thể là một công cụ thử nghiệm thiếu định hướng mà phải được tích hợp vào chiến lược dài hạn của tổ chức. 2. Đảm bảo tính minh bạch và trách nhiệm giải trình. Các thuật toán AI phải có khả năng giải thích được (explainability) để tránh những quyết định "hộp đen" (black box) (Castelvecchi, 2016). Cần có hệ thống giám sát AI nội bộ để giám sát hiệu quả hoạt động của AI. 3. Xây dựng bộ phận chuyên trách về AI và thiết lập cơ chế phản hồi. Doanh nghiệp cần có một ủy ban chuyên trách về AI, không chỉ bao gồm chuyên gia công nghệ mà còn có đại diện từ bộ phận pháp lý, nhân sự, truyền thông và quản trị rủi ro. Tạo ra các kênh phản hồi nội bộ, nơi nhân viên có thể báo cáo về các vấn đề liên quan đến AI một cách minh bạch. 4. Đào tạo và nâng cao nhận thức về AI trong doanh nghiệp. Không chỉ đội ngũ kỹ thuật mà cả nhân viên ở các phòng ban khác cũng cần hiểu về AI để tránh những hiểu lầm và sử dụng AI một cách có trách nhiệm. Tổ chức hội thảo nội bộ về AI và quản trị AI để nâng cao nhận thức.

4.3. Truyền thông nội bộ: Yếu tố then chốt trong quản trị AI có trách nhiệm

Một điểm đáng chú ý là, dù nhiều doanh nghiệp đầu tư vào AI, nhưng rất ít doanh nghiệp có chiến lược truyền thông nội bộ về AI một cách bài bản. Khi nhân viên không hiểu AI đang được sử dụng như thế nào, họ có thể: lo ngại về việc mất việc làm do AI (Sadeghi, 2024); không tin tưởng vào các quyết định của AI, dẫn đến sự phản kháng trong nội bộ doanh nghiệp (Glikson & Woolley, 2020; Li & Bitterly, 2024); hoặc sử dụng AI một cách tùy tiện, gây ra các hậu quả không mong muốn. Vậy nên, để giải quyết vấn đề này, doanh nghiệp cần: công khai thông tin về cách AI đang được sử dụng; tổ chức các buổi đào tạo về AI cho nhân viên; tạo ra môi trường cởi mở, nơi mọi người có thể đặt câu hỏi và đóng góp ý kiến về AI.

5. KẾT LUẬN

Trong bối cảnh AI ngày càng trở thành một công nghệ cốt lõi trong doanh nghiệp, nghiên cứu này nhấn mạnh rằng việc triển khai AI không thể chỉ dựa trên hiệu suất công nghệ mà cần gắn kết chặt chẽ với chiến lược tổ chức và các nguyên tắc đạo đức. Nếu AI được triển khai mà thiếu một khung quản trị rõ ràng, doanh nghiệp có thể gặp phải rủi ro pháp lý, tổn hại danh tiếng và mất niềm tin từ khách hàng, đối tác.

Bài nghiên cứu đã phân tích thực trạng ứng dụng AI trong doanh nghiệp, chỉ ra các thách thức chính như thiếu minh bạch, vấn đề thiên lệch, vi phạm quyền riêng tư dữ liệu và sự thiếu liên kết giữa AI và mục tiêu tổ chức. Để giải quyết những vấn đề này, nghiên cứu đề xuất một mô hình quản trị AI có trách nhiệm, dựa trên bảy nguyên tắc cốt lõi, bao gồm Trách nhiệm giải trình (Accountability); Đa dạng, không phân biệt đối xử và công bằng (Diversity, nondiscrimination and fairness); Nâng cao vai trò con người và giám sát (Human agency and oversight); Quyền riêng tư và quản trị dữ liệu (Privacy and data governance); Độ an toàn và khả năng chống chịu về mặt kỹ thuật (Technical robustness and safety); Tính minh bạch (Transparency); Phát triển AI vì lợi ích xã hội và môi trường (Social and environmental well-being) (Papagiannidis et al., 2025).

Bên cạnh đó, nghiên cứu nhấn mạnh tầm quan trọng của truyền thông nội bộ, nhằm giúp nhân viên hiểu rõ AI đang được sử dụng như thế nào, giảm thiểu lo ngại và thúc đẩy sự hợp tác trong tổ chức. AI không thể vận hành trong một môi trường thiếu kiểm soát. Một doanh nghiệp thành công trong kỷ nguyên số không chỉ là doanh nghiệp ứng dụng AI nhanh nhất, mà là doanh nghiệp biết quản trị AI có trách nhiệm, đảm bảo sự phát triển bền vững và lợi ích xã hội lâu dài.

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AI TRONG DỊCH VỤ TÀI CHÍNH: ỨNG DỤNG, RỦI RO, QUẢN TRỊ BỀN VỮNG

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TÓM TẮT

Sự phát triển của trí tuệ nhân tạo (AI) đang định hình lại ngành dịch vụ tài chính, mở ra những cơ hội đột phá trong phân tích dữ liệu, quản lý rủi ro, phát hiện gian lận, cá nhân hóa dịch vụ và giao dịch thuật toán. Với khả năng xử lý khối lượng dữ liệu lớn trong thời gian thực, AI không chỉ giúp tối ưu hóa vận hành mà còn thay đổi cách ngân hàng và tổ chức tài chính tương tác với khách hàng. Tuy nhiên, việc triển khai AI cũng đặt ra nhiều thách thức, từ thiên lệch thuật toán, bảo mật dữ liệu, đến rủi ro đạo đức và tuân thủ quy định pháp lý. Nghiên cứu này cung cấp tổng quan các nghiên cứu hiện có về AI trong ngành dịch vụ tài chính, tập trung vào ba khía cạnh chính: (1) Ứng dụng AI trong tài chính - ngân hàng, (2) Rủi ro và thách thức trong triển khai AI, (3) Các mô hình quản trị AI có trách nhiệm. Tổng quan nghiên cứu chỉ ra rằng mặc dù AI có tiềm năng nâng cao hiệu quả trong ngành tài chính - ngân hàng, nhưng nếu không có cơ chế quản trị phù hợp, nó có thể làm gia tăng bất bình đẳng và rủi ro hệ thống. Do đó, các tổ chức tài chính cần xây dựng khung quản trị AI có trách nhiệm, không chỉ tuân thủ các quy định hiện hành mà còn hướng đến một hệ sinh thái AI an toàn, minh bạch và bền vững.

Từ khóa: Dịch vụ tài chính, AI, Quản trị AI có trách nhiệm

1. GIỚI THIỆU

Trí tuệ nhân tạo (AI) đang nhanh chóng trở thành một yếu tố then chốt trong việc chuyển đổi ngành dịch vụ tài chính, mang lại những cải tiến đáng kể về hiệu suất, độ chính xác và khả năng cá nhân hóa dịch vụ (Kabza, 2020; Ostmann & Dorobantu, 2021). Các ứng dụng AI đa dạng, từ phân tích dữ liệu tài chính, quản lý rủi ro, phát hiện gian lận, đến giao dịch thuật toán và tư vấn tài chính cá nhân, đã và đang được triển khai rộng rãi, góp phần nâng cao chất lượng dịch vụ và trải nghiệm khách hàng (Aziz & Andriansyah, 2023; Jiang et al., 2024; Pillai, 2023; Oyeniyi et al., 2024).

Tuy nhiên, song song với những lợi ích, việc ứng dụng AI trong lĩnh vực tài chính cũng đặt ra nhiều thách thức quan trọng. Một trong những vấn đề nổi bật là thiên lệch thuật toán (algorithmic bias), khi các mô hình AI có thể đưa ra quyết định không công bằng do dữ liệu huấn luyện chứa đựng các định kiến xã hội hoặc lịch sử. Điều này đặc biệt quan ngại trong việc chấm điểm tín dụng, khi các quyết định sai lệch có thể dẫn đến việc từ chối tín dụng không công bằng đối với một số nhóm khách hàng (Heaven, 2022; Milkau, 2023). Bảo mật dữ liệu và quyền riêng tư cũng là một thách thức lớn (Jim et al., 2024). Việc xử lý và lưu trữ khối lượng lớn thông tin nhạy cảm đòi hỏi các tổ chức tài chính phải đầu tư mạnh mẽ vào hạ tầng an ninh mạng và tuân thủ nghiêm ngặt các quy định về bảo vệ dữ liệu. Sự cố rò rỉ hoặc lạm dụng dữ liệu có thể gây ra hậu quả nghiêm trọng, ảnh hưởng đến uy tín và niềm tin của khách hàng (Aldboush & Ferdous, 2023).

Để khai thác tối đa tiềm năng của AI đồng thời giảm thiểu các rủi ro, quản trị AI có trách nhiệm (Responsible AI Governance) trở thành một yêu cầu cấp thiết. Điều này bao gồm việc thiết lập các khung pháp lý và đạo đức rõ ràng, đảm bảo tính minh bạch, trách nhiệm giải trình và công bằng trong mọi ứng dụng AI (Castelnovo, 2024; Fritz-Morgenthal et al., 2022). Các tổ chức tài chính cần phát triển các chính sách và quy trình quản trị AI toàn diện, từ giai đoạn thiết kế, triển khai đến giám sát và đánh giá liên tục, nhằm đảm bảo AI hoạt động theo đúng mục tiêu và giá trị cốt lõi của doanh nghiệp.

Nghiên cứu này sẽ tập trung phân tích các ứng dụng cụ thể của AI trong ngành dịch vụ tài chính, đánh giá những rủi ro và thách thức liên quan, đồng thời đề xuất các chiến lược và mô hình quản trị AI có trách nhiệm. Mục tiêu là cung cấp một cái nhìn tổng quan và sâu sắc, hỗ trợ các nhà quản lý và chuyên gia trong việc định hướng và triển khai AI một cách hiệu quả và bền vững trong lĩnh vực tài chính.

2. TỔNG HỢP NGHIÊN CỨU VỀ AI NGÀNH TÀI CHÍNH - NGÂN HÀNG

2.1 AI trong chấm điểm tín dụng (Credit Scoring)

Chấm điểm tín dụng là một trong những lĩnh vực ứng dụng AI phổ biến nhất trong tài chính - ngân hàng. Truyền

thống trước đây, các tổ chức tài chính sử dụng mô hình thống kê như Logistic Regression hoặc Decision Trees để đánh giá khả năng tín dụng của khách hàng dựa trên dữ liệu lịch sử của khách hàng (Bensic et al., 2005), chẳng hạn như điểm tín dụng FICO, thu nhập, và lịch sử nợ. Tuy nhiên, AI và Machine Learning (ML) đã nâng cao đáng kể độ chính xác và khả năng dự đoán của mô hình chấm điểm tín dụng.

Một số nghiên cứu đã chỉ ra rằng các mô hình Machine Learning như Random Forest và Gradient Boosting Machine có thể cải thiện độ chính xác của chấm điểm tín dụng so với mô hình thống kê truyền thống (Kulkarni & Dhage, 2019; Mendhe, 2024; Schmitt, 2022). Một số nghiên cứu khác cũng vận dụng công nghệ mới như big data, machine learning, AI để phân tích dữ liệu giao dịch ngân hàng và phát hiện rằng các đặc điểm hành vi (behavioral patterns) có thể dự báo khả năng vỡ nợ và phân tích khách hàng chính xác hơn nhiều so với phương pháp truyền thống (Cho, 2024; Hsieh, 2024; Seifipour & Mehrabian, 2025). FinTechs như USA's Zest AI, Kenya's M-Shwari và India's Paytm đã triển khai AI để đánh giá tín dụng dựa trên dữ liệu phi truyền thống, bao gồm hành vi tiêu dùng, tương tác trên mạng xã hội, và dữ liệu thiết bị di động (Nuka & Ogunola, 2024). Điều này giúp cải thiện khả năng tiếp cận tín dụng cho hàng triệu người không có hồ sơ tín dụng truyền thống.

Tuy nhiên, một vấn đề lớn trong việc sử dụng AI cho chấm điểm tín dụng là rủi ro thiên lệch thuật toán (algorithmic bias) (Antonevics, 2023; Heaven, 2022). Các nhà nghiên cứu đã cảnh báo rằng các mô hình AI có thể vô tình củng cố các thiên lệch hệ thống trong dữ liệu, dẫn đến việc phân biệt đối xử với một số nhóm khách hàng dựa trên chủng tộc, giới tính hoặc địa lý. Vì vậy, các ngân hàng và công ty tài chính cần triển khai các kỹ thuật kiểm soát thiên lệch (bias mitigation) và giải thích mô hình (explainable AI - XAI) để đảm bảo tính công bằng trong hệ thống chấm điểm tín dụng (Kingsman, 2021; Kłosok & Chlebus, 2020; Mathen & Paul, 2025).

Ngoài ra, các nghiên cứu hiện nay vẫn chủ yếu tập trung vào khía cạnh kỹ thuật mà chưa đánh giá đầy đủ tác động xã hội của các mô hình AI trong chấm điểm tín dụng. Việc triển khai AI mà không xét đến bối cảnh văn hóa, thu nhập và môi trường pháp lý có thể dẫn đến các hậu quả không lường trước, đặc biệt ở các nước đang phát triển. Do đó, các nghiên cứu trong tương lai cần sử dụng các phương pháp hỗn hợp, kết hợp định lượng và định tính, để phân tích toàn diện hơn.

2.2 AI trong phát hiện gian lận tài chính (Fraud Detection)

AI đã trở thành một công cụ quan trọng trong việc phát hiện gian lận tài chính, đặc biệt trong các giao dịch thẻ tín dụng, bảo hiểm và ngân hàng trực tuyến. Các phương pháp truyền thống dựa trên quy tắc (rule-based systems) có thể phát hiện các kiểu gian lận phổ biến nhưng thường bị hạn chế khi phải đối phó với các hình thức gian lận mới và tinh vi hơn.

Các nghiên cứu gần đây đã cho thấy rằng AI và Machine Learning có khả năng phát hiện gian lận chính xác hơn nhờ khả năng học tập từ dữ liệu và phát hiện các mẫu hành vi bất thường. Các nghiên cứu đã khám phá và xác nhận mô hình AI và machine learning có thể phát hiện gian lận với độ chính xác cao hơn các mô hình truyền thống (Ejiofor, 2023; Goriparthi, 2023). Một trong những lợi thế lớn của AI trong phát hiện gian lận là khả năng phân tích dữ liệu theo thời gian thực (real-time fraud detection) (Bello et al., 2023). Ví dụ, hệ thống của PayPal sử dụng AI để giám sát hàng triệu giao dịch mỗi giây, giúp phát hiện các hành vi đáng ngờ và chặn giao dịch ngay lập tức. Nhờ đó, tổn thất của công ty đã giảm đáng kể, đồng thời, khách hàng cũng tin tưởng hơn vào PayPal vì PayPal luôn có thể đáp ứng nhu cầu của người dùng (Sarma & Dey, 2021). Ngoài ra, AI cũng có thể phát hiện các mô hình gian lận ẩn bằng cách sử dụng học sâu không giám sát (unsupervised deep learning) (Gomes et al., 2021).

Tuy nhiên, một thách thức lớn trong phát hiện gian lận là tỷ lệ dương tính giả (false positives), khi hệ thống gắn nhãn các giao dịch hợp lệ là gian lận (Olateju et al., 2024). Điều này có thể gây phiền toái cho khách hàng và làm mất uy tín của tổ chức tài chính (Zaid & Garai, 2024). Vì vậy, cần có các mô hình AI tiên tiến (Olateju et al., 2024), và sự kết hợp giữa giám sát con người và hệ thống tự động (Nagar, 2018).

2.3 AI trong giao dịch thuật toán (Algorithmic Trading)

AI đang cách mạng hóa giao dịch tài chính thông qua giao dịch thuật toán (algorithmic trading), còn được gọi là giao dịch tần suất cao (high-frequency trading - HFT). Giao dịch thuật toán sử dụng AI để phân tích dữ liệu thị trường theo thời gian thực và thực hiện các lệnh mua/bán chỉ trong vài mili-giây, tạo ra lợi thế cạnh tranh cho các công ty tài chính (Cohen, 2022; Dananjayan et al., 2023).

Theo nghiên cứu của Sonkavde et al. (2023), các Machine Learning (ML) and Deep Learning (DL) đã được sử dụng

để tối ưu hóa chiến lược giao dịch (Roslan et al., 2023; Sonkavde et al., 2023). Các công ty như Citadel Securities, Renaissance Technologies và Goldman Sachs đã ứng dụng AI để phân tích dữ liệu thị trường và ra quyết định giao dịch một cách tự động (Addy et al., 2024; Devapitchai et al., 2024; Singh, 2025).

Tuy nhiên, giao dịch thuật toán cũng gây ra nhiều lo ngại, đặc biệt là nguy cơ gây biến động thị trường. Sự cố "Flash Crash" năm 2010 là một ví dụ điển hình, khi các thuật toán giao dịch tự động đã gây ra sự sụt giảm 1000 điểm của chỉ số Dow Jones (Betancourt et al., 2011; Boulton et al., 2014 Massei, 2023). Do đó, cần có các cơ chế quản lý rủi ro và kiểm soát giao dịch AI, đảm bảo tính ổn định của thị trường tài chính.

2.4 AI trong cá nhân hóa dịch vụ tài chính và tư vấn đầu tư

AI cũng đóng vai trò quan trọng trong việc cá nhân hóa dịch vụ tài chính và tư vấn đầu tư, giúp khách hàng đưa ra quyết định tài chính tốt hơn. Các hệ thống Robo-Advisors như Betterment, Wealthfront, và Schwab Intelligent Portfolios phân tích hồ sơ rủi ro của khách hàng và đề xuất danh mục đầu tư tối ưu (Lam, 2016; Park et al., 2016; Phoon & Koh, 2018; Shanmuganathan, 2020). Bên cạnh đó, AI còn giúp ngân hàng và công ty tài chính cá nhân hóa trải nghiệm khách hàng, từ gợi ý sản phẩm tài chính, chatbot hỗ trợ khách hàng thông minh đến phân tích hành vi chi tiêu để đề xuất giải pháp tiết kiệm phù hợp (Anaya et al., 2924; Bhattacharya & Sinha, 2022; Satheesh et al., 2020). Các nghiên cứu khác cũng cho thấy rằng các ngân hàng ứng dụng AI trong cá nhân hóa dịch vụ đã góp phần tăng mức độ hài lòng của khách hàng (Alnaser et al., 2023; Shaikh et al., 2014) và giảm chi phí vận hành (Fethi, & Pasiouras, 2010; Pattanayak, 2023).

Tuy nhiên, cá nhân hóa tài chính cũng đặt ra câu hỏi về quyền riêng tư dữ liệu (Rohella et al., 2024), vì AI cần thu thập và phân tích lượng lớn thông tin cá nhân. Điều này đòi hỏi các tổ chức tài chính cần tuân thủ nghiêm ngặt các quy định về bảo vệ dữ liệu để đảm bảo sự minh bạch và tin cậy.

Bên cạnh đó, cần đánh giá tác động dài hạn của việc cá nhân hóa tài chính dựa trên AI đến hành vi tài chính và khả năng độc lập tài chính của khách hàng. Một số chuyên gia lo ngại rằng AI có thể khiến người tiêu dùng quá phụ thuộc vào khuyến nghị máy móc mà thiếu tư duy phản biện. Do đó, cần nghiên cứu các cơ chế kiểm soát hoặc giám sát để đảm bảo rằng AI chỉ đóng vai trò hỗ trợ, không thay thế hoàn toàn quyết định tài chính cá nhân.

Tổng quan cho thấy rằng AI đã được ứng dụng rộng rãi trong nhiều phân khúc tài chính, từ chấm điểm tín dụng đến phát hiện gian lận. Tuy nhiên, sự đa dạng về phương pháp, dữ liệu và bối cảnh áp dụng cũng cho thấy sự thiếu nhất quán trong kết quả nghiên cứu. Việc kết nối và đánh giá chéo các nghiên cứu là cần thiết để xác định các yếu tố then chốt ảnh hưởng đến hiệu quả và rủi ro khi triển khai AI trong thực tế.

Bên cạnh đó, cần có sự phân tầng rõ ràng trong tổng hợp nghiên cứu: (1) theo loại hình AI (ML, DL, XAI, Generative AI), (2) theo mục tiêu ứng dụng (chấm điểm tín dụng, phòng chống gian lận, tư vấn đầu tư…), và (3) theo vùng địa lý. Việc này sẽ giúp xác định khoảng trống nghiên cứu cụ thể và định hướng phát triển chính sách phù hợp từng khu vực kinh tế - xã hội.

3. RỦI RO VÀ THÁCH THỨC CỦA AI TRONG TÀI CHÍNH

Trí tuệ nhân tạo (AI) đã và đang mang lại những bước tiến đáng kể trong ngành dịch vụ tài chính, từ tối ưu hóa quy trình xử lý dữ liệu, dự đoán xu hướng thị trường, phát hiện gian lận, đến tự động hóa giao dịch thuật toán (Cohen, 2022; Dananjayan et al., 2023; Ejiofor, 2023; Goriparthi, 2023). Tuy nhiên, bên cạnh những lợi ích đó, việc ứng dụng AI vào lĩnh vực tài chính cũng tiềm ẩn nhiều rủi ro và thách thức. Những vấn đề này không chỉ ảnh hưởng đến hoạt động của các tổ chức tài chính mà còn tác động đến lòng tin của khách hàng, sự ổn định của thị trường, và khung pháp lý quản lý AI trong tài chính (Aldboush & Ferdous, 2023; Dewasiri et al., 2024; Ozili, 2024; Torrie & Payette, 2023).

3.1 Thiên lệch thuật toán và công bằng trong quyết định tài chính

Một trong những thách thức lớn nhất của AI trong lĩnh vực tài chính là thiên lệch thuật toán (algorithmic bias), có thể dẫn đến những quyết định tài chính không công bằng, đặc biệt trong chấm điểm tín dụng, cấp vốn vay và đánh giá rủi ro khách hàng.

Các mô hình AI được huấn luyện dựa trên dữ liệu lịch sử, trong đó có thể tồn tại thiên lệch xã hội, giới tính, chủng tộc hoặc vùng địa lý. AI có thể vô tình học theo những thiên lệch có sẵn trong dữ liệu, từ đó đưa ra quyết định phân biệt đối xử với một số nhóm khách hàng nhất định. Ví dụ, một số hệ thống AI chấm điểm tín dụng đã bị phát hiện chấm điểm thấp hơn cho các nhóm khách hàng thuộc dân tộc thiểu số hoặc cư trú tại khu vực thu nhập thấp, dù họ có hồ sơ tài chính

tương đương với các nhóm khác (Antonevics, 2023; Heaven, 2022).

Điều này đặt ra yêu cầu rằng các hệ thống AI trong tài chính cần có các cơ chế kiểm soát thiên lệch và đảm bảo công bằng, bao gồm: Sử dụng thuật toán phát hiện và giảm thiểu thiên lệch (bias detection and mitigation algorithms) để giám sát mô hình AI (Bellamy et al., 2019; Fu et al., 2020; Nazer et al., 2023); Áp dụng nguyên tắc AI giải thích được (Explainable AI - XAI) để đảm bảo các quyết định tài chính không mang tính phân biệt đối xử (Kingsman, 2021; Kłosok & Chlebus, 2020; Mathen & Paul, 2025); Định kỳ kiểm tra và đánh giá dữ liệu đầu vào, đảm bảo tính đại diện của các nhóm khách hàng khác nhau (Oyeniran et al., 2022).

3.2 Bảo mật dữ liệu và quyền riêng tư khách hàng

Việc ứng dụng AI trong tài chính đòi hỏi khối lượng dữ liệu lớn về khách hàng, từ lịch sử giao dịch, dữ liệu thẻ tín dụng, tài khoản ngân hàng, cho đến thông tin cá nhân nhạy cảm như thu nhập, thói quen chi tiêu và nợ vay. Điều này dẫn đến rủi ro lớn về bảo mật dữ liệu và quyền riêng tư khách hàng, đặc biệt khi các tổ chức tài chính lưu trữ và xử lý dữ liệu trên nền tảng điện toán đám mây hoặc sử dụng AI để phân tích hành vi tài chính. Theo GDPR (General Data Protection Regulation) của Liên minh Châu Âu và CCPA (California Consumer Privacy Act), các tổ chức phải đảm bảo rằng dữ liệu khách hàng được thu thập và xử lý một cách minh bạch, có sự đồng ý rõ ràng từ người dùng, và được bảo vệ khỏi rủi ro rò rỉ hoặc tấn công mạng (Bonta, 2022; Goddard, 2017). Tuy nhiên, nhiều tổ chức vẫn chưa có cơ chế kiểm soát dữ liệu chặt chẽ, dẫn đến các sự cố bảo mật nghiêm trọng. Ví dụ, vào năm 2019, Capital One đã bị tấn công mạng, làm lộ thông tin cá nhân của hơn 100 triệu khách hàng, bao gồm số an sinh xã hội, lịch sử tài chính và số tài khoản ngân hàng (Novaes Neto et al., 2020).

Điều này đặt ra nhu cầu cấp thiết phải cải thiện hệ thống bảo mật dữ liệu AI, bao gồm: Sử dụng các phương pháp mã hóa dữ liệu tiên tiến để bảo vệ thông tin khách hàng khỏi rủi ro tấn công mạng (Farea et al., 2024); Áp dụng kỹ thuật học liên kết (Federated Learning) để AI có thể được đào tạo trên dữ liệu từ các thiết bị biên như máy tính xách tay, điện thoại thông minh và thiết bị đeo được mà không cần phải chuyển dữ liệu đến máy chủ trung tâm (Li et al., 2020); Tăng cường kiểm soát truy cập và phân quyền đối với hệ thống AI, đảm bảo rằng chỉ những cá nhân có quyền mới có thể truy cập dữ liệu tài chính nhạy cảm (Mehmood et al., 2016).

3.3 Minh bạch và trách nhiệm giải trình khi AI đưa ra quyết định

Một trong những thách thức quan trọng khác của AI trong tài chính là thiếu minh bạch trong quá trình ra quyết định. Nhiều mô hình AI hoạt động theo cơ chế "hộp đen" (black-box models), khiến ngay cả các chuyên gia cũng khó hiểu được cách AI đưa ra quyết định tài chính (Meena & Mishra, 2023; Von Eschenbach, 2021). Sự thiếu minh bạch này gây ra những lo ngại lớn về trách nhiệm giải trình (accountability), đặc biệt khi AI được sử dụng để đánh giá tín dụng, phê duyệt khoản vay hoặc phát hiện gian lận. Nếu một khách hàng bị từ chối vay vốn nhưng không thể hiểu lý do cụ thể, điều này có thể dẫn đến tranh chấp pháp lý và làm suy giảm lòng tin vào hệ thống tài chính. Để giải quyết vấn đề này, các tổ chức tài chính cần: Sử dụng mô hình AI có thể giải thích được (Explainable AI - XAI) để giúp con người hiểu rõ quyết định của AI (Meena & Mishra, 2023); Áp dụng quy trình giám sát và kiểm toán AI định kỳ nhằm đảm bảo tính minh bạch và công bằng trong hoạt động tài chính (Turksen et al., 2024); Thiết lập cơ chế khiếu nại và phản hồi để khách hàng có thể yêu cầu giải thích về các quyết định tài chính liên quan đến AI.

3.4 Nguy cơ thao túng thị trường từ giao dịch thuật toán

Giao dịch thuật toán (Algorithmic Trading) sử dụng AI để thực hiện hàng triệu giao dịch tài chính chỉ trong vài giây, tạo ra lợi thế đáng kể cho các tổ chức tài chính (Cohen, 2022; Dananjayan et al., 2023. Tuy nhiên, sự phụ thuộc quá mức vào giao dịch thuật toán có thể gây ra nguy cơ thao túng thị trường và gia tăng biến động. Sự kiện "Flash Crash" năm 2010 là một minh chứng điển hình. Khi đó, lỗ hổng trong các thuật toán giao dịch đã khiến chỉ số Dow Jones giảm hơn 1000 điểm trong vòng vài phút (Betancourt et al., 2011; Boulton et al., 2014 Massei, 2023).

Việc máy thay cho con người ra quyết định tự động trong lĩnh vực tài chính có thể dẫn đến nhiều rủi ro. Cụ thể, Navinder Singh Sarao, một nhà giao dịch tần suất cao, đã bị bị buộc tội lợi dụng một chương trình tự động để tạo ra các lệnh bán lớn nhằm đẩy giá xuống. Khi giá giảm, anh ta đã hủy các lệnh mua ở mức giá thị trường thấp hơn để hưởng lợi khi thị trường phục hồi. Đây là một trong những "lời cảnh tỉnh", không chỉ đối với các nhà giao dịch mà còn đối với các cơ quan quản lý, cho thấy một số thách thức của giao dịch tự động tốc độ cao và ra quyết định tự động nói chung. Để ngăn ngừa các sự cố tương tự trong tương lai, một số kỹ thuật được sử dụng để thao túng giao dịch tần suất cao, chẳng

hạn như giả mạo và phân lớp ("spoofing" và "layering"), đã bị cấm (Blauth et al., 2022).

Để kiểm soát rủi ro này, cần có các quy định chặt chẽ hơn về giao dịch thuật toán, bao gồm: Giới hạn tốc độ giao dịch AI nhằm ngăn chặn các đợt bán tháo quá nhanh, áp dụng các thuật toán giám sát AI để phát hiện các hành vi thao túng thị trường, tăng cường sự giám sát của các cơ quan quản lý tài chính, yêu cầu các tổ chức tài chính công khai thuật toán giao dịch khi cần thiết. Và trên hết, việc tăng cường hợp tác giữa các chính phủ, ngành công nghiệp, và các bên liên quan là rất quan trọng để tăng cường sự chuẩn bị và khả năng phục hồi trước việc sử dụng và lạm dụng AI với mục đích xấu (Blauth et al., 2022).

4. CÁC KHUNG QUẢN TRỊ AI CÓ TRÁCH NHIỆM TRONG NGÀNH TÀI CHÍNH

4.1. EU AI Act – Đạo luật AI của Liên minh Châu Âu

Liên minh Châu Âu (EU) là một trong những khu vực tiên phong trong việc xây dựng khung pháp lý toàn diện để điều chỉnh AI, trong đó Đạo luật AI (AI Act) do Ủy ban Châu Âu đề xuất là một bước tiến quan trọng (Edwards, 2021). Theo đó, AI trong tài chính được xếp vào nhóm rủi ro cao (high-risk AI systems) và phải tuân thủ các yêu cầu chặt chẽ về tính minh bạch, quản trị rủi ro, giám sát con người và kiểm soát thiên lệch thuật toán (Mazzini & Bagni, 2023).

Các tổ chức tài chính sử dụng AI trong chấm điểm tín dụng, phát hiện gian lận và giao dịch thuật toán phải đáp ứng các tiêu chí cụ thể. Đầu tiên là minh bạch và khả năng giải thích. Các mô hình AI phải có khả năng giải thích rõ ràng để người dùng và nhà quản lý hiểu được cách AI đưa ra quyết định (Papagiannidis et al., 2025). Tiếp đó, AI cần được giám sát bởi con người. AI không thể hoạt động hoàn toàn tự động trong các quyết định quan trọng liên quan đến tài chính. Cần có cơ chế giám sát con người để đảm bảo tính chính xác và công bằng (Papagiannidis et al., 2025). Cuối cùng, cần chú trọng quản lý rủi ro AI. Các tổ chức tài chính phải triển khai hệ thống giám sát AI liên tục để phát hiện và điều chỉnh các rủi ro tiềm ẩn (Sovrano et al., 2022).

4.2. Basel Committee và quản lý rủi ro AI trong ngân hàng

Basel Committee on Banking Supervision (BCBS) là tổ chức đưa ra các tiêu chuẩn toàn cầu về quản lý rủi ro ngân hàng, bao gồm việc sử dụng AI và Machine Learning trong hoạt động tài chính (Esho, 2022). Trong báo cáo năm 2022, Basel Committee nhấn mạnh rằng các mô hình AI trong ngân hàng cần đảm bảo tính ổn định tài chính, tránh rủi ro thiên lệch, có trách nhiệm và giải trình đối với các quyết định do AI đề xuất, và tăng cường khả năng giám sát. Các yêu cầu chính của Basel Committee đối với AI trong ngân hàng bao gồm: Đảm bảo tính nhất quán trong quản lý rủi ro; Giám sát liên tục các thuật toán AI, đặc biệt là các mô hình học sâu có thể thay đổi hành vi theo thời gian; Đánh giá lại mô hình AI theo định kỳ để duy trì độ chính xác cao (Basel Committee on Banking Supervision, 2022).

4.3. Nguyên tắc AI của OECD và hướng dẫn của FATF về phòng chống gian lận tài chính

Tổ chức Hợp tác và Phát triển Kinh tế (OECD) đã đưa ra Nguyên tắc AI có trách nhiệm (Morandín-Ahuerma, 2023), trong đó nhấn mạnh: AI phải lấy con người làm trung tâm (human-centric AI), đảm bảo rằng AI phục vụ lợi ích xã hội và không gây hại; Minh bạch và khả năng giải thích của AI là yếu tố quan trọng trong các quyết định tài chính; AI phải đảm bảo tính công bằng và không phân biệt đối xử trong quá trình xử lý dữ liệu tài chính (Morandín-Ahuerma, 2023).

Ngoài ra, Lực lượng Đặc nhiệm Hành động Tài chính (Financial Action Task Force - FATF) cũng đưa ra các hướng dẫn về sử dụng AI để phòng chống rửa tiền và gian lận tài chính, yêu cầu các tổ chức tài chính áp dụng AI một cách có trách nhiệm để đảm bảo tuân thủ quy định pháp luật (Pavlidis, 2023).

4.4. Chính sách nội bộ và hướng dẫn thực hành của các ngân hàng và tổ chức tài chính

Bên cạnh các quy định từ chính phủ và tổ chức quốc tế, nhiều ngân hàng lớn đã xây dựng chính sách nội bộ về AI có trách nhiệm, tập trung vào ba yếu tố chính: (1) Khung đạo đức AI trong tài chính: Ngân hàng HSBC, JPMorgan Chase, và Citibank đã phát triển các bộ quy tắc đạo đức AI để đảm bảo rằng AI được sử dụng công bằng và có trách nhiệm trong hoạt động tài chính (Ainous & Nouichi, 2024; Geelal et al., 2023; Ridzuan et al., 2024); (2) Quản lý dữ liệu và quyền riêng tư: Các ngân hàng áp dụng mô hình học liên kết (Federated Learning) và mã hóa dữ liệu đầu cuối (End-to-End Encryption) để giảm thiểu rủi ro bảo mật (Awosika et al., 2024; Irsyad & Indraningsih, 2024); (3) Kiểm soát AI nội bộ: Một số tổ chức tài chính đã thiết lập ủy ban giám sát AI, bao gồm các chuyên gia công nghệ, luật sư, và nhà quản lý rủi ro để kiểm tra các thuật toán AI trước khi triển khai (Kurshan et al., 2020).

Mặc dù các khung quản trị hiện tại như EU AI Act, OECD Principles và hướng dẫn FATF đã cung cấp nền tảng pháp lý ban đầu, chúng vẫn chưa xử lý triệt để các vấn đề như: Sự thiếu vắng các công cụ đánh giá hiệu quả cụ thể của AI trong thực tế (ví dụ như tác động đến lòng tin người dùng); Thiếu sự phân loại rõ ràng giữa các loại AI (AI giám sát, Generative AI, Explainable AI...) trong từng ngữ cảnh tài chính cụ thể.

Vậy nên, việc áp dụng mô hình quản trị AI có kết hợp Explainable AI (XAI) sẽ giúp cải thiện đáng kể mức độ chấp nhận của khách hàng đối với quyết định chấm điểm tín dụng tự động. Các nhà nghiên cứu mô hình lý thuyết có thể xây dựng mô hình nghiên cứu mối quan hệ giữa: Đặc điểm công nghệ (minh bạch, tính giải thích được); Yếu tố tổ chức (văn hóa dữ liệu, chính sách bảo mật); Niềm tin khách hàng và mức độ chấp nhận AI trong tài chính. Bên cạnh đó, các tổ chức tài chính cần triển khai khung đánh giá đạo đức AI nội bộ dựa trên các trụ cột: tính công bằng, khả năng giải thích, bảo mật và lợi ích xã hội. Họ cũng nên hợp tác với các viện nghiên cứu độc lập và tổ chức xã hội dân sự để kiểm định các mô hình AI trong bối cảnh thực tế, và xây dựng năng lực giám sát đa chiều nhằm ngăn ngừa các rủi ro tiềm ẩn từ sớm.

5. KẾT LUẬN

Nghiên cứu này phân tích vai trò, tác động của AI trong tài chính, từ ứng dụng thực tế như chấm điểm tín dụng, phát hiện gian lận, giao dịch thuật toán đến rủi ro về thiên lệch thuật toán, bảo mật dữ liệu và minh bạch. AI có thể khuếch đại thiên lệch, ảnh hưởng đến công bằng tài chính và lòng tin của khách hàng. Để giải quyết vấn đề này, nghiên cứu đã giới thiệu các khung quản trị AI có trách nhiệm, đảm bảo tuân thủ pháp lý, đạo đức và phát triển bền vững.

Nghiên cứu gợi ý một số hướng đi tiềm năng tiếp theo, bao gồm: phân tích tác động của AI lên lòng tin của khách hàng trong ngành tài chính: liệu khách hàng có tin tưởng vào các quyết định tài chính do AI đưa ra không? Nghiên cứu về AI Fairness trong tài chính: làm thế nào để giảm thiểu thiên lệch thuật toán một cách hiệu quả trong các mô hình chấm điểm tín dụng và đầu tư? Ứng dụng Generative AI trong tư vấn tài chính: những lợi ích và rủi ro của Generative AI trong quản lý tài sản cá nhân và đầu tư. Hướng nghiên cứu trong tương lai cần tập trung vào việc cải thiện khả năng giải thích của AI (XAI), đảm bảo tính công bằng và xây dựng các công nghệ giám sát AI tiên tiến, giúp ngành tài chính tận dụng tối đa lợi ích của AI mà vẫn bảo vệ quyền lợi của khách hàng và duy trì sự ổn định thị trường. Quản trị AI có trách nhiệm không chỉ là một yêu cầu pháp lý mà còn là yếu tố cốt lõi để xây dựng niềm tin và sự phát triển bền vững của ngành tài chính, nhằm đảm bảo rằng AI không chỉ tạo ra giá trị kinh tế mà còn phục vụ lợi ích chung của xã hội.

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PHÂN TÍCH SWOT VỀ CHUYỂN ĐỔI SỐ TRONG GIÁO DỤC ĐẠI HỌC TẠI THÀNH PHỐ HỒ CHÍ MINH

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TÓM TẮT

Trong bối cảnh cuộc cách mạng công nghiệp 4.0 và chiến lược chuyển đổi số toàn diện của Thành phố Hồ Chí Minh, giáo dục đại học đang đứng trước những cơ hội và thách thức lớn để đổi mới và phát triển. Nghiên cứu sử dụng phương pháp SWOT để phân tích thực trạng và tiềm năng chuyển đổi số, chỉ ra các lợi thế như hạ tầng công nghệ hiện đại, nguồn nhân lực chất lượng cao, kỹ năng công nghệ của sinh viên…. Tuy nhiên, quá trình này vẫn gặp khó khăn do thiếu đồng bộ trong triển khai, kỹ năng số chưa đồng đều và áp lực tài chính. Dựa trên phân tích, tác giả đề xuất các giải pháp như tăng cường đầu tư công nghệ, hợp tác công tư, xây dựng nền tảng số đồng bộ và đào tạo kỹ năng số nhằm thúc đẩy sự phát triển bền vững của giáo dục đại học tại Thành phố Hồ Chí Minh.

Từ khóa: chuyển đổi số, giáo dục, giáo dục đại học, thành phố Hồ Chí Minh.

1. TỔNG QUAN

Thành phố Hồ Chí Minh (TP. HCM) là trung tâm kinh tế, văn hóa và giáo dục lớn nhất cả nước, nơi tập trung nhiều trường đại học (ĐH), cơ sở nghiên cứu và lực lượng lao động chất lượng cao. Thực hiện chuyển đổi số không chỉ thay đổi phương thức giảng dạy mà còn tái định hình cách thức tiếp cận tri thức của giảng viên và sinh viên. Với sự thúc đẩy từ chính quyền TP. HCM trong chiến lược chuyển đổi số toàn diện, các trường đại học tại đây có tiềm năng dẫn đầu trong quá trình chuyển đổi số. Mặc dù có lợi thế về hạ tầng công nghệ, nhưng TP. HCM cũng đối mặt với các thách thức trong chuyển đổi số.

Các nghiên cứu từ 2020-2023 về CĐS trong giáo dục đại học chủ yếu tập trung vào việc triển khai hạ tầng công nghệ, chính sách hỗ trợ và khả năng tiếp cận của sinh viên. Tuy nhiên, những nghiên cứu này chưa phân tích sâu về tác động của CĐS đối với giảng viên, sinh viên và chiến lược phát triển lâu dài. Điểm khác biệt của bài viết này là: 1/ Phân tích SWOT chi tiết về CĐS trong giáo dục đại học, không chỉ dừng lại ở khía cạnh công nghệ mà còn xem xét yếu tố nhân lực, môi trường học tập và chính sách. 2/ Tập trung vào yếu tố con người, đặc biệt là mức độ sẵn sàng của giảng viên và sinh viên, điều chưa được khai thác đầy đủ trong các nghiên cứu trước. 3/ Đề xuất giải pháp cụ thể thay vì chỉ dừng lại ở việc mô tả hiện trạng.

2. PHƯƠNG PHÁP NGHIÊN CỨU

Nghiên cứu sử dụng phương pháp định tính kết hợp phân tích SWOT để đánh giá chuyển đổi số trong giáo dục ĐH tại TP. HCM. Dữ liệu được thu thập từ tài liệu chính sách, báo cáo chuyên môn và nghiên cứu trước đó, tập trung vào các trường điển hình như ĐH Quốc gia TP. HCM, ĐH Mở TP. HCM, ĐH Bách Khoa TP. HCM, ĐH Tôn Đức Thắng. Phân tích SWOT tập trung vào bốn yếu tố: (1) Điểm mạnh - lợi thế trong chuyển đổi số; (2) Hạn chế - khó khăn còn tồn tại; (3) Cơ hội - tiềm năng phát triển; (4) Thách thức - nguy cơ từ môi trường bên ngoài.

3. KẾT QUẢ NGHIÊN CỨU

3.1. Tổng quan về chuyển đổi số trong giáo dục đại học

3.1.1. Khái niệm chuyển đổi số (CĐS)

Hiện nay, có nhiều quan niệm khác nhau về chuyển đổi số. Theo Wikipedia, CĐS là quá trình áp dụng và triển khai công nghệ số của một tổ chức nhằm tạo ra các sản phẩm, dịch vụ và hoạt động mới hoặc sửa đổi các sản phẩm, dịch vụ và hoạt động hiện có bằng cách dịch các quy trình kinh doanh sang định dạng số. Young & Rogers (2019) cho rằng CĐS là một quá trình thay đổi bắt nguồn từ dữ liệu có mặt khắp nơi, khả năng kết nối và ra quyết định, từ đó làm thay đổi sản phẩm, quy trình và cơ cấu tổ chức. Theo Cẩm nang CĐS của Bộ Thông tin và truyền thông: "CĐS là bước phát triển tiếp theo của tin học hóa, có được nhờ sự tiến bộ vượt bậc của những công nghệ mới mang tính đột phá, nhất là công nghệ

số" (Bộ Thông tin và truyền thông, 2021). Theo quan niệm này, CĐS là một quá trình thay đổi về sử dụng công nghệ, gồm: 1) Ứng dụng công nghệ thông tin để nâng cao hiệu quả công việc; 2) Số hóa để chuyển đổi thông tin về dạng kĩ thuật số và sử dụng dữ liệu kĩ thuật số để đơn giản hóa quy trình làm việc; 3) Sử dụng sản phẩm số hóa và các công nghệ mới như AI, Big data, IoT… để tạo ra mô hình hoạt động mới của tổ chức. (Lê & Phạm, 2023). CĐS còn được hiểu là "quá trình thay đổi tổng thể và toàn diện của cá nhân, tổ chức về cách sống, cách làm việc và phương thức sản xuất dựa trên các công nghệ số" (Bộ Thông tin và truyền thông, 2021).

Có thể thấy CĐS là một quá trình thay đổi toàn diện, bao gồm cả việc áp dụng công nghệ số vào các hoạt động của tổ chức và thay đổi mô hình vận hành, quản lý, văn hóa làm việc. Các quan điểm tuy khác nhau nhưng đều nhấn mạnh vai trò của công nghệ số trong việc nâng cao hiệu quả công việc, tối ưu hóa quy trình, đồng thời tạo ra những giá trị và mô hình hoạt động mới. Như vậy, CĐS không chỉ là sự thay đổi về công nghệ mà còn là sự đổi mới toàn bộ cách thức vận hành, tư duy và văn hóa tổ chức nhằm thích ứng với xu hướng phát triển của thời đại số.

3.1.2. Chuyển đổi số trong giáo dục đại học

Giáo dục ĐH đóng vai trò quan trọng trong phát triển nguồn nhân lực chất lượng cao phục vụ cho sự phát triển của xã hội và đạt được các mục tiêu chiến lược của nền kinh tế quốc gia. Với nhiệm vụ chính là đào tạo nhân lực, thực hiện nghiên cứu khoa học, chuyển giao công nghệ và thúc đẩy hợp tác quốc tế, các trường ĐH cần phải đi đầu trong CĐS. Điều này sẽ giúp thực hiện thành công chiến lược CĐS quốc gia, đáp ứng yêu cầu đào tạo nguồn nhân lực cho Chính phủ số, nền kinh tế số và xã hội số.

Theo Chương trình chuyển đổi số quốc gia của Chính phủ (2020), giáo dục là một trong những ngành ưu tiên CĐS trước, với mục tiêu đến năm 2025 và định hướng đến năm 2030 "100% các cơ sở giáo dục triển khai công tác dạy và học từ xa, trong đó thử nghiệm chương trình đào tạo cho phép học sinh, sinh viên học trực tuyến tối thiểu 20% nội dung chương trình. Ứng dụng công nghệ số để giao bài tập về nhà và kiểm tra sự chuẩn bị của học sinh trước khi đến lớp học".

Nguyễn Mạnh Hùng (2020) cho rằng CĐS đại học thì việc đầu tiên cần làm là chuyển đổi toàn bộ trường đại học thành một "quốc gia số" thu nhỏ. Toàn bộ hoạt động của đại học, của giáo viên, của sinh viên sẽ chuyển lên môi trường số. Mỗi người trong đại học sẽ có một định danh số. Đại học là một xã hội thu nhỏ, sinh viên là những người trẻ, năng động và công nghệ, rất thuận lợi để xây dựng một xã hội số ở đây, không chỉ việc học mà cả việc quản lý và sinh hoạt. Muốn đào tạo nhân lực thời CĐS thì hãy cho họ sống, học tập và làm việc trong môi trường số, đây cũng là cách đào tạo kỹ năng số tốt nhất.

Theo Mohamed Hashim at el. (2022), trong lĩnh vực giáo dục ĐH, CĐS được coi là một cách để thu hút sinh viên chất lượng cao, cải thiện trải nghiệm học tập, cung cấp tài liệu giảng dạy chất lượng và triển khai phương pháp học tập kết hợp.

Qua phân tích ở trên, có thể hiểu CĐS trong giáo dục ĐH là quá trình ứng dụng công nghệ số vào mọi khía cạnh của hoạt động giáo dục để nâng cao chất lượng giảng dạy, quản lý và học tập. Như vậy, CĐS trong giáo dục ĐH không thể tách rời sự hỗ trợ của các công nghệ tiên tiến. Dưới đây là một số công nghệ chủ chốt đang thúc đẩy sự thay đổi mạnh mẽ trong giáo dục ĐH hiện nay:

Học trực tuyến (E-learning): Sinh viên có thể học mọi lúc, mọi nơi qua các nền tảng như Moodle, Blackboard, Zoom, giúp tiết kiệm chi phí và tạo cơ hội học tập linh hoạt cho nhiều đối tượng.

Thực tế ảo (VR): VR tạo môi trường 3D cho sinh viên trải nghiệm học tập sinh động, hữu ích trong các ngành Y khoa, Kỹ thuật, Hóa học. VR cũng hỗ trợ sinh viên khuyết tật như người khiếm thị và khiếm thính.

Trí tuệ nhân tạo (AI): AI cá nhân hóa học tập, đề xuất nội dung phù hợp, hỗ trợ giải đáp thắc mắc qua chatbots và tự động chấm bài, giúp tối ưu hóa thời gian giảng dạy và hỗ trợ sinh viên hiệu quả.

Dữ liệu lớn (Big Data): Big Data phân tích hành vi học tập của sinh viên, giúp cải thiện chiến lược giảng dạy, dự báo tuyển sinh và tối ưu hóa quy trình học tập, tạo môi trường học tập hiệu quả và cá nhân hóa.

Ngoài ra, còn có thể sử dụng một số công cụ khác như Blockchain, Điện toán đám mây, Gamification, Google Drive và Microsoft Teams và Internet of Things (IoT) để giúp cải thiện hiệu quả học tập, tăng cường sự linh hoạt và tạo ra môi trường giáo dục hiện đại.

3.1.3. Vai trò của chuyển đổi số trong giáo dục đại học

CĐS trong giáo dục ĐH có vai trò quan trọng trong việc nâng cao chất lượng đào tạo, cải thiện quản lý học tập và giảng dạy, đồng thời giúp các trường ĐH bắt kịp xu hướng phát triển của công nghệ và yêu cầu xã hội. Việc áp dụng các công nghệ số không chỉ giúp tối ưu hóa các quy trình giáo dục mà còn mở ra những cơ hội học tập linh hoạt, sáng tạo, phù hợp với nhu cầu ngày càng đa dạng của sinh viên và giảng viên. CĐS giúp giáo dục ĐH phát triển bền vững và đáp ứng được các yêu cầu trong môi trường học tập và làm việc hiện đại.

Trong nghiên cứu của mình, Kishor (2024) cho rằng CĐS có vai trò quan trọng trong giáo dục ĐH. Cụ thể, CĐS trong giáo dục ĐH giúp hướng tới những mục tiêu sau:

– Cải thiện môi trường học tập của sinh viên: Công nghệ nâng cao môi trường học tập thông qua các nền tảng giáo dục, video giảng dạy, các bài kiểm tra và câu đố trực tuyến. Các công cụ thực tế ảo và trí tuệ nhân tạo giúp sinh viên chia sẻ ý tưởng, tư duy và hiểu rõ hơn về các môn học.

– Nâng cao hiệu quả hoạt động của cơ sở giáo dục: CĐS cải thiện hiệu quả hoạt động của các cơ sở giáo dục thông qua phân tích mô tả (descriptive analytics), phân tích dự đoán (predictive analytics) và phân tích chẩn đoán (diagnostic analytics), từ đó đề xuất các giải pháp khả thi cho các vấn đề phát sinh.

– Tăng cường năng lực tính toán phục vụ nghiên cứu tiên tiến: Thư viện số và các cơ sở dữ liệu trực tuyến giúp truy cập và đánh giá các nghiên cứu khoa học. Công cụ tìm kiếm Google, nền tảng ResearchGate, Google Scholar, … hỗ trợ sinh viên và giảng viên tiếp cận nguồn tài liệu vô tận.

– Thúc đẩy đổi mới trong giáo dục: Công nghệ là công cụ thúc đẩy đổi mới. Nó giúp thay thế sách giáo khoa truyền thống bằng nội dung số và giảm chi phí thiết bị bằng cách sử dụng các nguồn tài nguyên thực tế ảo hoặc thực tế tăng cường.

– Nâng cao năng lực cạnh tranh: Mục tiêu này tập trung vào việc tạo sự khác biệt cho cơ sở giáo dục so với các đối thủ cạnh tranh thông qua việc ứng dụng các giải pháp số.

– Xây dựng văn hóa ra quyết định dựa trên dữ liệu: Điều này bao gồm việc áp dụng tư duy số trong tất cả các lĩnh vực của cơ sở giáo dục, từ sinh viên, giảng viên, ban lãnh đạo đến các nhân viên khác.

– Tối ưu hóa nguồn lực: Mục tiêu này bao gồm từ việc cải thiện giao tiếp giữa các nhà quản lý đến giảm chi phí vận hành, chẳng hạn như chi phí tiêu thụ điện năng.

3.2. Tình hình chuyển đổi số tại một số trường đại học ở TP. HCM

Đề án Chuyển đổi số TP. HCM 2025, tầm nhìn 2030, hướng đến biến TP. HCM thành đô thị thông minh với chính quyền số, doanh nghiệp số và xã hội số. Chương trình tập trung xây dựng hạ tầng số, phát triển nền tảng dữ liệu dùng chung và thúc đẩy kinh tế số. Trong giáo dục ĐH, đề án chú trọng xây dựng môi trường học tập thông minh, sử dụng công nghệ như AI, VR và Big Data để nâng cao chất lượng đào tạo và phát triển nguồn nhân lực thích ứng với nền kinh tế số. Theo Báo cáo của Bộ Giáo dục và Đào tạo (2024), ngành giáo dục và đào tạo đã hoàn thành xây dựng 100% các cơ sở dữ liệu của ngành giáo dục, trong đó có cơ sở dữ liệu về giáo dục đại học (HEMIS) với 470 cơ sở đào tạo ĐH, trên 25.000 chương trình đào tạo, trên 100.000 hồ sơ cán bộ, gần 3 triệu hồ sơ người học. TP. HCM hiện có hơn 50 cơ sở giáo dục ĐH, đóng góp tích cực vào sự phát triển khoa học công nghệ và nguồn nhân lực chất lượng cao. Nghiên cứu tập trung vào một số trường ĐH điển hình như ĐH Quốc gia TP. HCM, ĐH Mở TP. HCM, ĐH Bách Khoa TP. HCM, ĐH Tôn Đức Thắng … Các trường này được lựa chọn dựa trên các tiêu chí: những kết quả đạt được trong việc ứng dụng công nghệ số vào quản lý và giảng dạy, sự đa dạng trong các mô hình chuyển đổi số và đóng góp của các trường vào sự phát triển chung của giáo dục đại học tại TP. HCM và Việt Nam.

3.2.1. Trường Đại học Quốc gia Thành phố Hồ Chí Minh (VNU-HCM)

Năm 2024, trường ĐH Quốc gia TP. HCM đã đạt nhiều thành tựu quan trọng trong CĐS, góp phần nâng cao hiệu quả quản lý, giảng dạy và nghiên cứu khoa học. Theo Khắc Hiếu (2024), nhà trường đã hoàn thành giai đoạn 1 của Đề án CĐS với việc triển khai hệ thống ký số tích hợp Trục liên thông văn bản quốc gia, xây dựng trung tâm dữ liệu quản lý thông tin của gần 6.000 giảng viên, viên chức và người lao động. Trong đào tạo, VNU-HCM đã phát triển hệ thống học liệu số dùng chung, xây dựng và triển khai 21 khóa học trực tuyến trên nền tảng MOOCs, đồng thời áp dụng Blended Learning cho 71 môn học. Những cải tiến này giúp nâng cao chất lượng giảng dạy, tạo điều kiện cho sinh viên tiếp cận

kiến thức một cách linh hoạt hơn. Về nghiên cứu khoa học, VNU-HCM tiếp tục dẫn đầu cả nước với hơn 3.120 bài báo công bố quốc tế thuộc danh mục Scopus, vượt chỉ tiêu đặt ra. Đồng thời, trường đã triển khai hiệu quả các dự án nghiên cứu hợp tác với TP. HCM và tỉnh Bình Dương, ứng dụng công nghệ số trong nghiên cứu và phát triển. Những thành tựu trên khẳng định vị thế tiên phong của VNU-HCM trong việc ứng dụng công nghệ vào giáo dục đại học, thúc đẩy CĐS và nâng cao chất lượng đào tạo, nghiên cứu trong bối cảnh cách mạng công nghiệp 4.0.

3.2.2. Trường Đại học Mở TP. HCM (OU)

Trường ĐH Mở TP. HCM cũng là một trong những trường có kết quả nổi bật trong lĩnh vực CĐS, đặc biệt trong việc ứng dụng công nghệ vào quản lý và giảng dạy. Một trong những điểm nhấn quan trọng là sự phát triển mạnh mẽ của nền tảng học tập trực tuyến. Năm 2021, OU ra mắt hệ thống VMOOCs, cung cấp miễn phí hơn 40 khóa học trực tuyến mở đại chúng, giúp người học dễ dàng tiếp cận kiến thức mọi lúc, mọi nơi chỉ với thiết bị kết nối Internet. Đến năm 2024, hệ thống VMOOCs đã mở rộng với hơn 60 khóa học, thu hút hàng nghìn học viên tham gia, đặc biệt là các khóa học về kỹ năng số và các lĩnh vực công nghệ mới như AI và Big Data (Trường Đại học Mở TP. HCM, 2024). Bên cạnh đó, từ năm 2019, trường cũng triển khai thí điểm mô hình đào tạo kết hợp dành cho sinh viên chính quy, kết hợp giữa học trực tuyến và trực tiếp. Điều này giúp OU nhanh chóng thích ứng và đảm bảo việc dạy và học không bị gián đoạn trong bối cảnh đại dịch COVID-19. Ngoài ra, OU còn tích cực mở rộng quan hệ hợp tác với nhiều đơn vị và tổ chức nhằm thúc đẩy chuyển đổi số và nâng cao chất lượng giáo dục. Trong năm 2024, trường đã ký kết thêm các thỏa thuận hợp tác với các tổ chức giáo dục quốc tế và các doanh nghiệp công nghệ lớn, nhằm triển khai các dự án về nghiên cứu AI, phát triển nền tảng học tập trực tuyến và cung cấp các khóa học nâng cao về công nghệ số. Trường cũng tiếp tục duy trì mối quan hệ hợp tác với UBND tỉnh Bình Phước, Trường Cao đẳng Cộng đồng Hà Nội, Trường Cao đẳng Cộng đồng Cà Mau, Trung tâm Hỗ trợ thanh niên công nhân TP.HCM, Công ty VIAGS Tân Sơn Nhất và Hội Kiểm toán viên hành nghề Việt Nam. Những hợp tác này không chỉ tạo điều kiện thuận lợi cho quá trình CĐS trong giáo dục mà còn góp phần nâng cao chất lượng đào tạo, đáp ứng nhu cầu học tập và phát triển kỹ năng của người học trong thời đại công nghệ số.

3.2.3. Trường Đại học Bách Khoa TP. HCM (HCMUT)

Trong CĐS, trường ĐH Bách Khoa TP. HCM đã đạt nhiều thành tựu đáng chú ý, đặc biệt với việc triển khai công trình số hóa toàn diện cơ sở vật chất. Tháng 10/2023, trường đã tiếp nhận và đưa vào sử dụng công trình CĐS đa nền tảng, giúp số hóa toàn bộ không gian của hai cơ sở tại quận 10 và Dĩ An (Bình Dương), bao gồm 29 tòa nhà và 50 phòng thí nghiệm thuộc 12 khoa và trung tâm đào tạo. Hệ thống này cho phép sinh viên và giảng viên tham quan trực tuyến khuôn viên trường bằng các thiết bị như máy tính, điện thoại, iPad và kính thực tế ảo, đồng thời cung cấp hình ảnh 360 độ, thông tin song ngữ Việt - Anh, video giới thiệu về các khoa, trung tâm và thiết bị giảng dạy. Đến năm 2024, công trình số hóa đã được mở rộng và hoàn thiện với việc tích hợp thêm các tính năng AI và phân tích dữ liệu lớn, cho phép trường thu thập và phân tích thông tin về sự tương tác của sinh viên và giảng viên trong các không gian học tập và nghiên cứu. Bên cạnh đó, công trình còn tích hợp nhiều tính năng tương tác hiện đại, cho phép người dùng đo đạc vị trí, tính toán các thông số hình học và so sánh sự thay đổi cơ sở vật chất theo thời gian. Thư viện số hóa của trường cũng được phát triển mạnh mẽ trong năm 2024, với hơn 100.000 tài liệu học tập được số hóa và bổ sung thêm các nguồn tài liệu mở từ các đối tác quốc tế. Điều này giúp sinh viên truy cập tài liệu học tập một cách dễ dàng và không bị giới hạn về không gian và thời gian, đồng thời hỗ trợ việc nghiên cứu và học tập từ xa, đáp ứng nhu cầu học tập linh hoạt trong thời đại công nghệ số.

3.2.4. Đại học Tôn Đức Thắng (TDTU)

Trường ĐH Tôn Đức Thắng cũng có nhiều thành công trong CĐS, tập trung vào việc hiện đại hóa mô hình quản trị, nâng cao chất lượng giảng dạy và mở rộng hợp tác nghiên cứu. Nhà trường đã phát triển mô hình quản trị ĐH số bằng cách số hóa các quy trình nghiệp vụ, ứng dụng phân tích dữ liệu lớn và trí tuệ nhân tạo, đồng thời nâng cấp hệ thống hành chính điện tử để tối ưu hiệu quả hoạt động. Trong năm 2024, TDTU tiếp tục hoàn thiện các hệ thống số hóa, với việc tích hợp thêm các công cụ AI để hỗ trợ việc ra quyết định trong các hoạt động quản lý và đào tạo. Trong lĩnh vực đào tạo, TDTU đã mở thêm các chuyên ngành mới như Kiểm toán và Phân tích dữ liệu, Kỹ thuật thiết kế vi mạch bán dẫn và Luật thương mại quốc tế nhằm đáp ứng nhu cầu nhân lực trong kỷ nguyên số. Trường cũng chú trọng đào tạo giảng viên về ứng dụng công nghệ trong giảng dạy, giúp nâng cao chất lượng học tập của sinh viên. Đặc biệt, trong năm 2024, trường đã nâng cấp chương trình đào tạo giảng viên với các khóa học về AI, học máy (Machine Learning) và phân tích dữ liệu

lớn (Big Data), nhằm cải thiện hiệu quả giảng dạy và nghiên cứu. Bên cạnh đó, TDTU đã ký kết hợp tác với Tập đoàn FPT vào năm 2023 và tiếp tục thúc đẩy các dự án nghiên cứu về trí tuệ nhân tạo và chuyển đổi số trong giáo dục trong năm 2024. Trường cũng đang triển khai các dự án hợp tác quốc tế để phát triển các nền tảng học trực tuyến và tích hợp công nghệ VR/AR vào giảng dạy.

Mặc dù tốc độ tiếp cận công nghệ tại các cơ sở giáo dục đại học ở TP.HCM khá nhanh, nhưng vẫn còn một số bất cập về hạ tầng công nghệ tại một số trường. Nhiều trường vẫn gặp khó khăn trong việc đầu tư và triển khai hạ tầng số đồng bộ, dẫn đến sự khác biệt trong mức độ áp dụng công nghệ trong giảng dạy và học tập. Điều này đòi hỏi các cơ sở giáo dục cần nỗ lực hơn nữa để hoàn thiện cơ sở hạ tầng, đáp ứng yêu cầu chuyển đổi số trong giáo dục ĐH.

3.3. Phân tích SWOT về chuyển đổi số trong giáo dục đại học tại TP. HCM

Qua tình hình CĐS của một số trường ĐH ở TP. HCM, tác giả sử dụng phân tích SWOT để có đánh giá toàn diện cả về nội lực và ngoại lực trong CĐS. Kết quả như sau:

3.3.1. Điểm mạnh (Strengths):

TP. HCM đang dẫn đầu trong chuyển đổi số giáo dục ĐH nhờ vào nhiều điểm mạnh vượt trội.

– Hạ tầng công nghệ hiện đại: Các trường ĐH tại TP. HCM đã triển khai các nền tảng học trực tuyến (LMS) mạnh mẽ như Moodle, Blackboard, Canvas... giúp giảng viên và sinh viên tương tác hiệu quả, cung cấp tài liệu học tập phong phú và công cụ đánh giá linh hoạt. Bên cạnh các trường ĐH điển hình đã phân tích ở trên, có thể kể đến một số trường ĐH khác cũng có đầu tư về hạ tầng công nghệ hiện đại như: trường ĐH Công nghệ TP. HCM, ĐH Sư phạm Kỹ thuật TP. HCM…

– Nguồn nhân lực chất lượng cao: Các trường ĐH tại TP. HCM sở hữu đội ngũ giảng viên và chuyên gia công nghệ chất lượng cao, có khả năng ứng dụng công nghệ hiệu quả trong giảng dạy và nghiên cứu khoa học. Giảng viên được đào tạo qua các khóa học và chương trình tập huấn về công nghệ giảng dạy, giúp họ thành thạo các công cụ học trực tuyến, phần mềm quản lý lớp học và chấm điểm tự động. Sự sáng tạo trong giảng dạy được thúc đẩy nhờ công nghệ như video, mô phỏng 3D, và gamification, mang đến phương pháp học hấp dẫn và hiệu quả. Ngoài ra, nhiều giảng viên còn tham gia nghiên cứu quốc tế và hợp tác với các tổ chức giáo dục lớn, góp phần nâng cao chất lượng giảng dạy và áp dụng các phương pháp tiên tiến vào chương trình đào tạo.

– Sinh viên tại TP. HCM được trang bị kỹ năng học tập trực tuyến và công nghệ từ sớm, giúp họ chủ động trong việc tiếp cận tài liệu, tham gia khóa học trực tuyến và tự định hướng học tập theo nhu cầu cá nhân. Các công cụ học tập trực tuyến và nền tảng quản lý lớp học không chỉ giúp sinh viên dễ dàng tương tác với giảng viên và bạn bè, mà còn thúc đẩy sự hợp tác, phát triển kỹ năng làm việc nhóm thông qua thảo luận và dự án nhóm trực tuyến.

– Chương trình đào tạo: Các trường ĐH tại TP. HCM đã cập nhật chương trình đào tạo, tích hợp phương thức học kết hợp, kết hợp học trực tuyến với học trực tiếp, giúp sinh viên linh hoạt trong việc lựa chọn phương thức học và đảm bảo chất lượng đào tạo. Chương trình học được thiết kế để đáp ứng nhu cầu ngày càng cao của thị trường lao động, đặc biệt trong các ngành công nghệ cao, khoa học dữ liệu, trí tuệ nhân tạo và các lĩnh vực liên quan đến số hóa. Đồng thời, các môn học về công nghệ thông tin, kỹ năng số và các công cụ hỗ trợ công việc đã được đưa vào chương trình đào tạo, giúp sinh viên trang bị đầy đủ kỹ năng cần thiết để làm việc hiệu quả trong môi trường số hiện đại.

3.3.2. Điểm yếu (Weaknesses):

– Áp lực tài chính: Việc triển khai công nghệ, xây dựng hệ thống hạ tầng mạng, mua sắm thiết bị hiện đại và phát triển các nền tảng học trực tuyến yêu cầu nguồn đầu tư lớn. Đối với các trường ĐHcông lập hoặc các trường có ngân sách hạn chế, việc đầu tư vào công nghệ trở thành một thách thức lớn. Chi phí duy trì và nâng cấp hạ tầng công nghệ để đáp ứng nhu cầu học tập và giảng dạy trực tuyến có thể gây áp lực lên tài chính của nhà trường. Điều này dẫn đến tình trạng một số trường gặp khó khăn trong việc cung cấp dịch vụ học tập trực tuyến chất lượng cao, hạn chế khả năng ứng dụng công nghệ trong giảng dạy, và ảnh hưởng đến trải nghiệm học tập của sinh viên.

– Kỹ năng số chưa đồng đều: Kỹ năng số của giảng viên và sinh viên vẫn còn nhiều hạn chế và chưa đồng đều, ảnh hưởng đến hiệu quả của quá trình chuyển đổi số trong giáo dục. Mặc dù một số giảng viên và sinh viên đã có khả năng sử dụng công nghệ khá tốt, nhưng kết quả từ khảo sát với 30 giảng viên và 50 sinh viên tại Trường Đại học Quốc gia Thành phố Hồ Chí Minh và Đại học Tôn Đức Thắng cho thấy, khoảng 40% giảng viên và 35% sinh viên vẫn gặp khó

khăn trong việc tiếp cận và sử dụng các công cụ học tập trực tuyến, phần mềm quản lý lớp học, và các nền tảng giáo dục số. Cụ thể, 30% giảng viên cho biết họ thiếu kỹ năng sử dụng phần mềm giảng dạy trực tuyến, trong khi 25% sinh viên phản ánh không thể truy cập đầy đủ các tài liệu học tập do hạ tầng công nghệ kém. Điều này không chỉ làm giảm hiệu quả trong việc giảng dạy mà còn cản trở sinh viên trong việc tham gia các khóa học trực tuyến, ảnh hưởng đến chất lượng học tập. Ngoài ra, việc thiếu kỹ năng số cũng gây khó khăn cho việc áp dụng các phương pháp giảng dạy sáng tạo như gamification, mô phỏng 3D, hay học qua video, khiến cho việc sử dụng công nghệ trở nên kém hiệu quả.

– Thiếu sự đồng bộ trong triển khai: CĐS tại các trường ĐH TP. HCM còn gặp phải sự thiếu đồng bộ trong việc triển khai công nghệ và các chương trình đào tạo. Các trường ĐH có sự khác biệt rõ rệt về khả năng ứng dụng công nghệ, từ cơ sở hạ tầng đến chất lượng giảng dạy trực tuyến. Một số trường đã có các nền tảng học tập trực tuyến tiên tiến và đội ngũ giảng viên giàu kinh nghiệm, trong khi những trường khác vẫn đang trong quá trình cập nhật công nghệ và đào tạo giảng viên. Điều này tạo ra sự bất bình đẳng trong môi trường học tập, ảnh hưởng đến trải nghiệm của sinh viên và hiệu quả của CĐS trong toàn ngành giáo dục ĐH. Sự không đồng bộ này còn khiến việc chia sẻ tài nguyên học tập và hợp tác nghiên cứu giữa các trường trở nên khó khăn hơn, làm giảm khả năng phát triển giáo dục ĐH một cách bền vững và toàn diện.

3.3.3. Cơ hội (Opportunities):

– Chính sách phát triển CĐS: CĐS trong giáo dục ĐH tại TP. HCM đang được thúc đẩy mạnh mẽ thông qua nhiều chính sách hỗ trợ từ cả cấp quốc gia và địa phương. Nổi bật là Chương trình Chuyển đổi số Quốc gia (2020), Đề án tăng cường ứng dụng CNTT trong giáo dục (2022-2025) theo Quyết định 131/QĐ-TTg, và Bộ chỉ số đánh giá CĐS do Bộ GD&ĐT ban hành, giúp các trường xây dựng lộ trình phù hợp.

– Cơ hội hợp tác quốc tế: CĐS trong giáo dục ĐH tại TP. HCM tạo ra cơ hội lớn cho hợp tác quốc tế, đặc biệt trong bối cảnh toàn cầu hóa và sự phát triển nhanh chóng của công nghệ. Các trường ĐH có thể kết nối và hợp tác với các tổ chức giáo dục, trường ĐHhàng đầu và công ty công nghệ quốc tế để phát triển các chương trình đào tạo chất lượng cao, trao đổi giảng viên và sinh viên, cũng như tham gia vào các dự án nghiên cứu chung. Hợp tác quốc tế giúp các trường cập nhật các phương pháp giảng dạy tiên tiến, tiếp cận với tài nguyên học tập đa dạng và cải thiện chất lượng đào tạo. Sinh viên cũng sẽ có cơ hội tham gia các chương trình học tập và thực tập ở môi trường quốc tế, từ đó nâng cao kỹ năng, mở rộng mạng lưới kết nối và phát triển sự nghiệp toàn cầu.

– Nhu cầu thị trường lao động: Nhu cầu thị trường lao động trong kỷ nguyên số đang thay đổi nhanh chóng, đòi hỏi nhân lực có kỹ năng số cao và khả năng ứng dụng công nghệ trong công việc. Các ngành như công nghệ thông tin, khoa học dữ liệu, trí tuệ nhân tạo, và các lĩnh vực số hóa đang phát triển mạnh, tạo ra nhu cầu lớn về nguồn nhân lực chất lượng cao. Điều này mở ra cơ hội cho các trường ĐH tại TP. HCM phát triển chương trình đào tạo phù hợp với nhu cầu thực tế của thị trường lao động. Các trường có thể hợp tác với các doanh nghiệp để cung cấp các khóa học thực tế, chương trình thực tập và cơ hội nghề nghiệp cho sinh viên, từ đó đảm bảo sinh viên ra trường có năng lực và sẵn sàng đáp ứng yêu cầu của các công ty.

– Hợp tác với doanh nghiệp: Các doanh nghiệp trong các lĩnh vực công nghệ, tài chính, sản xuất… có thể tham gia xây dựng chương trình đào tạo, cung cấp tài nguyên, giảng viên thực tiễn, hoặc hỗ trợ học bổng và thực tập cho sinh viên. Điều này giúp sinh viên tiếp cận với môi trường làm việc thực tế, nâng cao khả năng ứng dụng kiến thức vào công việc và phát triển kỹ năng mềm quan trọng. Các doanh nghiệp cũng có thể tham gia vào các dự án nghiên cứu, giúp trường ĐH cải thiện chất lượng giảng dạy và đồng thời cung cấp nguồn nhân lực chất lượng cho chính doanh nghiệp của mình. Sự hợp tác này không chỉ mang lại lợi ích cho cả trường đại học và sinh viên, mà còn tạo ra một môi trường học tập năng động, gắn kết chặt chẽ với thực tế thị trường lao động.

3.3.4. Thách thức (Threats):

– Cạnh tranh gay gắt trong áp dụng công nghệ: Các trường ĐH không chỉ cạnh tranh với nhau mà còn phải đối mặt với sự phát triển nhanh chóng của các nền tảng học trực tuyến toàn cầu và các tổ chức giáo dục quốc tế. Điều này đòi hỏi các trường phải không ngừng cập nhật và đổi mới các công nghệ giảng dạy để giữ vững sức hấp dẫn đối với sinh viên, đồng thời nâng cao chất lượng đào tạo. Tuy nhiên, không phải trường nào cũng có đủ nguồn lực tài chính và đội ngũ chuyên gia để phát triển và duy trì các nền tảng công nghệ giảng dạy tiên tiến. Điều này tạo ra sự phân hóa trong chất lượng đào tạo và cơ hội học tập giữa các trường, làm gia tăng sự cạnh tranh không chỉ về chất lượng mà còn về khả năng thu hút

sinh viên và nguồn lực.

– Rủi ro bảo mật và quyền riêng tư: Khi chuyển đổi sang môi trường học tập số, vấn đề bảo mật thông tin và quyền riêng tư trở thành một thách thức lớn. Việc sử dụng các nền tảng học trực tuyến và lưu trữ dữ liệu học tập trên hệ thống điện toán đám mây tạo ra rủi ro tiềm ẩn về sự an toàn của thông tin cá nhân và dữ liệu học tập. Các cuộc tấn công mạng, rò rỉ dữ liệu và xâm phạm quyền riêng tư có thể xảy ra bất cứ lúc nào nếu không có biện pháp bảo vệ mạnh mẽ.

– Chuyển đổi phương pháp học tập và giảng dạy: Chuyển đổi phương pháp học tập từ hình thức truyền thống sang hình thức trực tuyến hoặc kết hợp là một thách thức không nhỏ đối với cả giảng viên và sinh viên. Mặc dù công nghệ mang lại nhiều cơ hội mới, nhưng việc thay đổi thói quen và phương pháp học tập cũ đòi hỏi một quá trình thích nghi lâu dài. Đối với giảng viên, quá trình này có thể gặp phải sự khó khăn trong việc điều chỉnh phương pháp sư phạm, duy trì sự tương tác và quản lý lớp học hiệu quả. Trong khi đó, đối với sinh viên, việc học tập trực tuyến đòi hỏi kỹ năng tự học cao, tính kỷ luật và khả năng quản lý thời gian tốt, điều này có thể gây khó khăn đối với những sinh viên chưa quen với hình thức học tập mới. Hơn nữa, việc duy trì sự hấp dẫn và tương tác trong môi trường học trực tuyến cũng là một thử thách lớn, khi thiếu đi sự gần gũi và gắn kết giữa giảng viên và sinh viên, dẫn đến tình trạng mất động lực học tập.

3.4. Đề xuất giải pháp cho giáo dục đại học tại TP. HCM

Để đạt được thành công trong CĐS, các trường ĐH tại TP. HCM cần khắc phục các điểm yếu, vượt qua các thách thức và khai thác tối đa tiềm năng của công nghệ. Trên cơ sở phân tích SWOT về CĐS trong các trường ĐH tại TP. HCM, tác giả đề xuất một số giải pháp như sau:

Thứ nhất, đầu tư vào hạ tầng công nghệ và bảo mật: Các trường cần nâng cấp hệ thống mạng tốc độ cao, đầu tư vào phòng học ảo, nền tảng học trực tuyến và trang bị các thiết bị học tập hiện đại. Đồng thời, việc bảo mật thông tin cũng phải được chú trọng với các biện pháp như mã hóa dữ liệu, xác thực đa yếu tố (2FA), tường lửa và hệ thống giám sát an ninh mạng nhằm bảo vệ dữ liệu cá nhân của giảng viên, sinh viên cũng như tài liệu học tập quan trọng.

Thứ hai, đào tạo và phát triển kỹ năng số: cần tổ chức các khóa đào tạo chuyên sâu cho giảng viên về hệ thống quản lý học tập (LMS), công cụ hỗ trợ giảng dạy số như AI, VR, đồng thời hướng dẫn phương pháp giảng dạy trực tuyến hiệu quả. Sinh viên cũng cần được trang bị kỹ năng số, giúp họ sử dụng thành thạo các nền tảng học trực tuyến, công cụ hỗ trợ học tập và giao tiếp hiệu quả trong môi trường số.

Thứ ba, hợp tác công tư và với các tổ chức quốc tế: nên tập trung vào các hình thức hợp tác như: 1/ Liên kết với doanh nghiệp công nghệ để triển khai hệ thống LMS, AI, VR trong giảng dạy và nâng cấp hạ tầng số; 2/ Phát triển chương trình đào tạo gắn với doanh nghiệp, tổ chức khóa học thực hành và đào tạo song hành; 3/ Hợp tác với các tổ chức giáo dục quốc tế để triển khai khóa học trực tuyến, trao đổi giảng viên, cập nhật giáo trình theo chuẩn quốc tế; 4/ Tìm kiếm tài trợ và hỗ trợ kỹ thuật từ các tổ chức quốc tế để nâng cao năng lực giảng dạy số; 5/ Thiết lập trung tâm đổi mới sáng tạo hợp tác với doanh nghiệp nhằm nghiên cứu và ứng dụng công nghệ vào giáo dục.

Thứ tư, xây dựng chiến lược dài hạn và quản lý thay đổi: Mỗi trường cần có một chiến lược rõ ràng, phù hợp với đặc điểm riêng của mình, trong đó bao gồm kế hoạch triển khai công nghệ, đào tạo nhân sự và cải tiến phương pháp giảng dạy. Để đảm bảo quá trình này diễn ra thuận lợi, các trường cần thành lập các nhóm hỗ trợ giúp giảng viên, sinh viên và cán bộ quản lý thích ứng với sự thay đổi, giảm thiểu những khó khăn khi tiếp cận công nghệ mới.

Thứ năm, tăng cường công bằng số: Các trường ĐH cần phải cung cấp hỗ trợ tài chính và thiết bị học tập cho những sinh viên có hoàn cảnh khó khăn, đảm bảo mọi sinh viên đều có cơ hội tiếp cận công nghệ, đặc biệt ở vùng ngoại thành. Điều này giúp giảm thiểu sự chênh lệch trong tiếp cận giáo dục giữa các sinh viên, đồng thời tạo ra một môi trường học tập bình đẳng cho mọi đối tượng.

Thứ sáu, đánh giá và cải tiến liên tục trong quá trình chuyển đổi: thiết lập hệ thống phản hồi từ giảng viên, sinh viên và các bên liên quan để kịp thời điều chỉnh chương trình đào tạo, cải tiến công nghệ giảng dạy và nâng cao chất lượng học tập. Việc cập nhật, tối ưu hóa hệ thống học tập trực tuyến và phương pháp giảng dạy sẽ giúp duy trì chất lượng đào tạo và đảm bảo sinh viên được tiếp cận với những công nghệ giáo dục tiên tiến nhất.

Để triển khai hiệu quả các giải pháp, cần xây dựng một lộ trình thực hiện rõ ràng. Lộ trình này giúp các trường thực hiện từng bước, từ nâng cấp hạ tầng công nghệ, đào tạo giảng viên và sinh viên, đến hợp tác với doanh nghiệp và tổ chức quốc tế, đảm bảo sự phát triển bền vững và liên tục tối ưu hóa.

Giai đoạn 1: Xây dựng cơ sở hạ tầng và triển khai đào tạo (0-2 năm)

Giai đoạn này tập trung nâng cấp hạ tầng công nghệ, bao gồm cải thiện hệ thống mạng, triển khai phòng học ảo và nền tảng học trực tuyến. Các biện pháp bảo mật như mã hóa dữ liệu và xác thực đa yếu tố (2FA) cần được áp dụng. Đồng thời, tổ chức đào tạo giảng viên về hệ thống LMS và công cụ giảng dạy trực tuyến, cùng với việc trang bị kỹ năng số cho sinh viên.

Giai đoạn 2: Triển khai hợp tác và hoàn thiện đào tạo (2-4 năm)

Các trường cần hợp tác với doanh nghiệp công nghệ để triển khai LMS, AI, VR và nâng cấp hạ tầng. Phát triển chương trình đào tạo thực hành gắn với doanh nghiệp và hợp tác với tổ chức giáo dục quốc tế để cập nhật giáo trình. Thiết lập trung tâm đổi mới sáng tạo với doanh nghiệp để nghiên cứu và ứng dụng công nghệ vào giáo dục.

Giai đoạn 3: Đánh giá và tối ưu hóa (4-6 năm)

Trong giai đoạn này, cần thu thập phản hồi từ giảng viên và sinh viên để điều chỉnh chương trình đào tạo, tối ưu hóa công nghệ giảng dạy. Đồng thời, tăng cường công bằng số bằng cách cung cấp hỗ trợ tài chính và thiết bị học tập cho sinh viên có hoàn cảnh khó khăn, giúp giảm thiểu sự chênh lệch trong tiếp cận công nghệ.

Giai đoạn 4: Bền vững và phát triển liên tục (6 năm trở đi)

Các trường cần duy trì và nâng cấp hạ tầng công nghệ, cập nhật chương trình đào tạo để đáp ứng các xu hướng công nghệ mới. Quản lý thay đổi bền vững và tạo môi trường học tập sáng tạo, liên tục cải tiến công cụ giảng dạy và phương pháp học tập để duy trì chất lượng giáo dục.

4. KẾT LUẬN

Chuyển đổi số trong giáo dục đại học tại TP. HCM là một xu hướng tất yếu và đang ngày càng trở nên quan trọng trong bối cảnh phát triển công nghệ và yêu cầu ngày càng cao của thị trường lao động. Việc ứng dụng công nghệ vào giảng dạy và học tập không chỉ giúp nâng cao chất lượng giáo dục mà còn tạo ra cơ hội để sinh viên và giảng viên tiếp cận những phương pháp học tập và nghiên cứu tiên tiến. Tuy nhiên, quá trình này không thiếu thử thách, đặc biệt là với các vấn đề về hạ tầng công nghệ, bảo mật, và sự thiếu đồng bộ trong triển khai.

Bài viết này đóng góp vào việc phân tích bối cảnh chuyển đổi số tại các trường đại học TP. HCM, từ đó đưa ra cái nhìn tổng quan về các thách thức và cơ hội mà các trường đối mặt. Đồng thời, bài viết cũng đề xuất các giải pháp cụ thể để triển khai chuyển đổi số một cách hiệu quả, bao gồm đầu tư vào hạ tầng công nghệ, đào tạo kỹ năng số cho giảng viên và sinh viên, xây dựng chiến lược chuyển đổi số dài hạn, và đảm bảo công bằng số.

Để nghiên cứu sâu hơn và đánh giá hiệu quả của quá trình chuyển đổi số, cần có các nghiên cứu đo lường tác động sau một khoảng thời gian cụ thể (ví dụ: sau 2 năm). Việc đánh giá này sẽ giúp xem xét sự cải thiện trong chất lượng đào tạo, mức độ hài lòng của sinh viên và giảng viên, và khả năng thích ứng của các trường đại học với sự phát triển công nghệ. Từ đó, có thể đề xuất các giải pháp điều chỉnh nhằm nâng cao hiệu quả chuyển đổi số trong giáo dục đại học tại TP. HCM.

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HỆ THỐNG QUẢN LÝ CHẤT THẢI NÔNG NGHIỆP ĐÔ THỊ - URBAN AGRO-WASTE MANAGEMENT

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TÓM TẮT

TP.HCM đang đối mặt với lượng chất thải đô thị ngày càng gia tăng, đặc biệt là chất thải hữu cơ, chiếm 50-60% trong tổng số 13.000 tấn/ngày vào năm 2024. Việc giảm diện tích đất nông nghiệp hạn chế khả năng tái sử dụng chất thải hữu cơ, đặt ra yêu cầu cấp thiết về một hệ thống quản lý bền vững. Nghiên cứu này phân tích thực trạng quản lý chất thải nông nghiệp đô thị (Urban Agro-Waste) tại TP.HCM, tập trung vào các phương pháp thu gom, xử lý và tái chế. Đồng thời, nghiên cứu đề xuất mô hình kinh tế tuần hoàn và công nghệ thông minh (IoT, AI) nhằm nâng cao hiệu quả quản lý. Kết quả cho thấy việc ứng dụng IoT tối ưu hóa giám sát và thu gom chất thải, trong khi AI cải thiện phân loại và tăng tỷ lệ tái chế. Ngoài ra, tiềm năng sản xuất biogas từ chất thải nông nghiệp giúp giảm ô nhiễm và cung cấp nguồn năng lượng bền vững.

Từ khóa: Biogas, IoT & AI, Kinh tế tuần hoàn, Quản lý chất thải, Urban Agro-Waste

1. TỔNG QUAN

Bối cảnh nghiên cứu

TP.HCM là một trong những đô thị lớn nhất Việt Nam, với tốc độ đô thị hóa nhanh chóng, kéo theo sự gia tăng đáng kể về chất thải đô thị, đặc biệt là chất thải hữu cơ. Thành phố tạo ra trung bình 13.000 tấn chất thải sinh hoạt mỗi ngày vào năm 2024, trong đó 50-60% là chất thải hữu cơ (B&Company, 2025). Đồng thời, diện tích đất nông nghiệp suy giảm đáng kể, ảnh hưởng đến khả năng tái sử dụng chất thải hữu cơ trong sản xuất nông nghiệp đô thị (Tien, Vo, & Chau, 2020). Sự gia tăng chất thải nông nghiệp đô thị, cùng với nhu cầu cấp thiết về các giải pháp bền vững, đặt ra yêu cầu xây dựng một hệ thống quản lý chất thải hiệu quả, dựa trên nguyên tắc kinh tế tuần hoàn (De Zeeuw & Drechsel, 2015). Mô hình này khuyến khích tái sử dụng, tái chế và thu hồi tài nguyên, giúp giảm áp lực lên hệ thống xử lý rác thải đô thị (Mohan, 2020). Trong bối cảnh này, nông nghiệp đô thị có thể đóng vai trò quan trọng bằng cách tận dụng chất thải hữu cơ để sản xuất phân compost hoặc làm thức ăn cho vật nuôi, qua đó hỗ trợ tái tạo tài nguyên và giảm thiểu ô nhiễm (Deelstra & Girardet, 2000; Menyuka et al., 2021). Ngoài ra, việc sản xuất biogas từ chất thải hữu cơ không chỉ giúp giảm thiểu lượng chất thải mà còn cung cấp nguồn năng lượng tái tạo, góp phần phát triển một hệ thống quản lý chất thải nông nghiệp đô thị bền vững (Bolzonella et al., 2018; Rutz, 2019). Với tiềm năng này, việc tích hợp mô hình kinh tế tuần hoàn vào quản lý chất thải nông nghiệp đô thị không chỉ mang lại lợi ích về môi trường và kinh tế mà còn góp phần thúc đẩy TP.HCM tiến tới một hệ thống đô thị phát triển bền vững hơn.

Mục tiêu nghiên cứu

Nghiên cứu này phân tích dữ liệu thứ cấp để đánh giá tình trạng chất thải nông nghiệp đô thị tại TP.HCM, tập trung vào thành phần chất thải hữu cơ và tiềm năng tái chế. Dựa trên mô hình kinh tế tuần hoàn, mục tiêu là đề xuất một hệ thống quản lý tối ưu (Erälinna & Szymoniuk, 2021; De Zeeuw & Drechsel, 2015). Ngoài ra, nghiên cứu xem xét vai trò của công nghệ thông minh, bao gồm:

- IoT: Hỗ trợ thu thập dữ liệu thời gian thực, giúp tối ưu hóa giám sát, thu gom và xử lý chất thải.
- AI & Học máy: Tự động hóa phân loại chất thải và tối ưu hóa quy trình tái chế hữu cơ, bao gồm cả ủ phân.
- Biogas: Đánh giá tiềm năng sản xuất năng lượng từ chất thải nông nghiệp đô thị, giảm thiểu chôn lấp và hướng đến quản lý bền vững.

Ý nghĩa của nông nghiệp đô thị và phát triển bền vững

Nông nghiệp đô thị không chỉ góp phần đảm bảo an ninh lương thực mà còn giúp giảm thiểu chất thải và thúc đẩy

phát triển bền vững. Tại Singapore, hệ thống canh tác thẳng đứng "A-Go-Gro" đã thành công trong việc tận dụng chất thải hữu cơ để sản xuất phân bón (Tien, Vo, & Chau, 2020). Công nghệ cũng đóng vai trò quan trọng trong nâng cao hiệu quả quản lý chất thải:

– Nông nghiệp kỹ thuật số: Tích hợp máy tính và cảm biến thông minh để đo lường chính xác lượng chất thải, tối ưu hóa thu gom và xử lý (Le, Binh, & Han, 2024).

– AI: Tự động hóa phân loại chất thải, nâng cao hiệu suất tái chế hữu cơ thành phân bón vi sinh (Le, Binh, & Han, 2024).

Kết quả kỳ vọng

Nghiên cứu này hướng đến đề xuất một mô hình quản lý chất thải nông nghiệp đô thị thông minh cho TP.HCM, phù hợp với xu hướng phát triển bền vững. Những kết quả mong đợi bao gồm: Giảm lượng chất thải hữu cơ thải ra môi trường, góp phần giảm áp lực lên hệ thống xử lý rác thải của thành phố. Tạo ra nguồn phân bón hữu cơ và năng lượng sinh học tại chỗ, giảm sự phụ thuộc vào các nguồn tài nguyên bên ngoài. Nâng cao hiệu quả sử dụng tài nguyên, thúc đẩy một nền nông nghiệp đô thị bền vững. Góp phần vào mục tiêu xây dựng thành phố xanh và thông minh, hỗ trợ các chính sách phát triển đô thị bền vững.

Câu hỏi nghiên cứu

– Những thách thức hiện tại trong quản lý chất thải nông nghiệp đô thị tại TP.HCM là gì?

– Công nghệ thông minh (IoT & AI) có thể tối ưu hóa quy trình thu gom và xử lý chất thải như thế nào?

– Tiềm năng của biogas từ chất thải nông nghiệp đô thị trong việc cung cấp năng lượng tái tạo là gì?

Phạm vi nghiên cứu

Nghiên cứu này tập trung vào việc phân tích dữ liệu thứ cấp, bao gồm:

Báo cáo chính phủ về chính sách môi trường và quản lý chất thải tại TP.HCM. Các nghiên cứu khoa học về quản lý chất thải nông nghiệp đô thị, ứng dụng công nghệ thông minh và tiềm năng sản xuất biogas. Báo cáo ngành từ các tổ chức và doanh nghiệp liên quan đến quản lý chất thải và tái chế. Phạm vi nghiên cứu không bao gồm khảo sát thực địa hoặc thu thập dữ liệu sơ cấp, mà tập trung vào việc đánh giá các mô hình quản lý chất thải đô thị và đề xuất giải pháp phù hợp với điều kiện của TP.HCM.

2. PHƯƠNG PHÁP

2.1. Tổng quan lý thuyết

2.1.1. Quản lý Chất thải Nông nghiệp Đô thị

Tổng quan về phát sinh chất thải từ nông nghiệp đô thị

Sự gia tăng dân số và đô thị hóa nhanh tại TP.HCM đã làm tăng đáng kể lượng chất thải nông nghiệp đô thị, đặc biệt là chất thải hữu cơ từ hoạt động trồng trọt, chăn nuôi và chế biến thực phẩm (Van Veenhuizen, 2006; Menyuka et al., 2020). Chất thải thực phẩm chiếm tỷ lệ lớn trong tổng lượng chất thải rắn đô thị (MSW) và có xu hướng gia tăng khi thu nhập hộ gia đình tăng (Schneider et al., 2017). Lượng chất thải rắn sinh hoạt tại TP.HCM đã tăng từ 1.164 tấn/ngày (1992) lên 8.845 tấn/ngày (2017), trong đó 60-70% là chất thải hữu cơ (Loan et al., 2020; Schneider et al., 2017). Bên cạnh đó, hoạt động nông nghiệp đô thị – bao gồm trồng trọt và nuôi trồng thủy sản – cũng tạo ra một lượng chất thải nông nghiệp đáng kể (Afolalu et al., 2021). Trong bối cảnh kinh tế tuần hoàn, chất thải nông nghiệp có thể được tái chế thành tài nguyên hữu ích, như phân bón hữu cơ hoặc năng lượng sinh học (biogas) (Menyuka et al., 2020; Weidner & Hamm, 2019). Việc xây dựng một hệ thống quản lý hiệu quả là cần thiết để tối ưu hóa việc thu gom, xử lý và tái sử dụng chất thải nông nghiệp đô thị tại TP.HCM.

Các chiến lược quản lý chất thải hiện tại tại thành phố Hồ Chí Minh và các thành phố khác.

Quản lý chất thải rắn sinh hoạt (MSW) là một trong những thách thức môi trường nghiêm trọng nhất tại TP.HCM, chủ yếu do lượng chất thải phát sinh ngày càng tăng trong khi cơ sở hạ tầng thu gom và xử lý chưa đáp ứng đủ nhu cầu (Loan et al., 2020). Hiện nay, thành phố đang triển khai một số giải pháp nhằm giảm thiểu chôn lấp và tận dụng chất thải hữu cơ, bao gồm:

Phân loại tại nguồn và tái chế, tập trung vào chất thải hữu cơ để sản xuất phân compost hoặc biogas (Loan et al., 2020). Tái sử dụng chất thải nông nghiệp đô thị, kết hợp với các dòng thải hữu cơ khác để tối ưu hóa quản lý tài nguyên (Schneider et al., 2017). Ứng dụng công nghệ xử lý tiên tiến, bao gồm ủ phân compost, sản xuất biogas, và đốt thu hồi năng lượng đối với các loại chất thải có giá trị nhiệt trị cao (Loan et al., 2020).

Chất thải nông nghiệp đô thị, đặc biệt là tàn dư thực vật và chất thải thực phẩm, có thể trở thành nguồn tài nguyên quan trọng cho sản xuất phân bón hữu cơ hoặc chuyển hóa thành năng lượng sinh học (Schneider et al., 2017). Việc tích hợp các mô hình tuần hoàn tài nguyên vào quản lý chất thải có thể hỗ trợ phát triển nông nghiệp đô thị bền vững, đồng thời giảm áp lực lên hệ thống xử lý rác thải tại TP.HCM (De Zeeuw & Drechsel, 2015).

Nhiều nghiên cứu đã chỉ ra tiềm năng tái sử dụng chất thải hữu cơ đô thị, bao gồm chất thải thực phẩm và chất thải nông nghiệp, để phục vụ nông nghiệp đô thị. Ủ phân compost là một trong những phương pháp phổ biến giúp tạo ra phân bón hữu cơ, giảm nhu cầu sử dụng phân bón hóa học và thúc đẩy phát triển bền vững (Van Veenhuizen, 2006; De Zeeuw & Drechsel, 2015).

Các nghiên cứu điển hình tại Marilao (Philippines), Kumasi (Ghana) và Nairobi (Kenya) đã chứng minh khả năng tái chế chất thải hữu cơ để phục vụ sản xuất nông nghiệp. Tuy nhiên, hầu hết các nghiên cứu tập trung vào chất thải từ hộ gia đình và chợ, trong khi chất thải nông nghiệp đô thị chưa được nghiên cứu sâu (De Zeeuw & Drechsel, 2015).

Theo nguyên tắc hệ thống trao đổi chất đô thị, chất thải cần được xem là nguồn tài nguyên cho các hoạt động sản xuất khác, bao gồm nông nghiệp (Schneider et al., 2017). Một số khu vực đã áp dụng mô hình tuần hoàn, trong đó thức ăn thừa và chất thải chợ được tận dụng làm thức ăn gia súc, và phân gia súc sau đó được dùng làm phân bón (De Zeeuw & Drechsel, 2015). Mô hình này giúp giảm thiểu chất thải, tối ưu hóa dòng chảy tài nguyên và hướng tới một hệ thống thực phẩm bền vững.

2.1.2. Công Nghệ trong quản lý chất thải

2.1.2.1. Ứng dụng IoT & AI trong giám sát và xử lý chất thải

a. Internet of Things (IoT) trong giám sát chất thải

IoT đóng vai trò quan trọng trong việc giám sát và quản lý chất thải thông qua các hệ thống cảm biến thông minh. Theo Aazam et al. (2016), các cảm biến IoT được tích hợp vào thùng rác thông minh giúp theo dõi mức đầy theo thời gian thực, tối ưu hóa lộ trình thu gom, và giảm thiểu tình trạng quá tải. Các hệ thống như PBLMU và HBLMU còn hỗ trợ định vị GPS, nâng cao hiệu quả vận hành (Vishnu et al., 2021). Ngoài ra, công nghệ CloudSWAM cho phép phân loại rác tại nguồn, giảm áp lực lên các bãi chôn lấp.

Hiệu quả của IoT trong tối ưu hóa lộ trình thu gom

Minh (2023) báo cáo rằng việc sử dụng thùng rác thông minh tích hợp IoT giúp giảm tới 50% số lần thu gom không cần thiết và giảm chi phí thu gom đến 30%. Tại Singapore, hệ thống "Smart Waste Management System" đã giúp giảm 60% tình trạng rác thải đầy trên đường phố nhờ cảm biến IoT xác định chính xác thời điểm thùng rác đầy và chỉ điều phối xe thu gom khi cần thiết.

Giám sát lượng chất thải và phát hiện cháy

Theo Ali et al. (2020), lượng chất thải trung bình thu gom từ các thùng rác IoT cao hơn so với thùng rác truyền thống. Cụ thể, ở vòng đọc thứ nhất, lượng chất thải trung bình từ thùng rác IoT đạt 94.45 kg so với 70.04 kg từ thùng rác không có IoT. Ngoài ra, hệ thống IoT còn cho thấy độ chính xác phát hiện cháy lên đến 99-100%.

Hiệu quả của IoT trong phân loại rác tại nguồn

Hệ thống CloudSWAM sử dụng công nghệ phân loại rác ngay từ nguồn, cho phép tách biệt chất thải hữu cơ và tái chế, góp phần giảm tải cho các bãi chôn lấp (Aazam et al., 2016).

b. Trí tuệ nhân tạo (AI) trong tối ưu hóa quản lý chất thải

AI giúp tự động hóa phân loại rác, nâng cao hiệu suất tái chế và giảm chi phí vận hành (Fang et al., 2023). Một số ứng dụng chính bao gồm:

Lập kế hoạch thu gom

AI có khả năng phân tích dữ liệu từ cảm biến để tối ưu hóa tuyến đường thu gom, giúp giảm chi phí nhiên liệu và

thời gian vận chuyển (Vishnu et al., 2021). Tại Barcelona, Tây Ban Nha, AI đã được sử dụng để phân tích dữ liệu từ hệ thống giám sát IoT, giúp tối ưu hóa quy trình thu gom rác và giảm thiểu chi phí (Minh, 2023).

Nhận diện và phân loại chất thải

Các hệ thống AI sử dụng Machine Learning để nhận diện chính xác các loại rác như nhựa, kim loại, giấy (Fang et al., 2023). Công ty Fujitsu (Nhật Bản) đã triển khai hệ thống AI trong các nhà máy xử lý, giúp phân loại rác nhanh chóng và chính xác. Robot phân loại rác của ZenRobotics (Mỹ) sử dụng học sâu và dữ liệu từ cảm biến để tối ưu hóa quá trình phân loại. Theo Fang et al. (2023), hệ thống này có thể phân loại từ 2000-2800 lựa chọn mỗi giờ với độ chính xác gần 100%.

Dự đoán lượng rác thải và bảo trì thiết bị

AI có thể phân tích dữ liệu lịch sử để dự đoán lượng rác thải, hỗ trợ lập kế hoạch quản lý tài nguyên và ngân sách (Minh, 2023). Các mô hình học máy như mạng nơ-ron nhân tạo (ANN) và máy vectơ hỗ trợ (SVM) đã được sử dụng để dự đoán sản lượng chất thải tại các đô thị lớn như New York (Fang et al., 2023). Ngoài ra, AI còn hỗ trợ bảo trì dự đoán bằng cách phân tích dữ liệu từ các cảm biến nhiệt độ, độ rung của thiết bị xử lý rác, giúp giảm thiểu thời gian chết và chi phí sửa chữa (Minh, 2023).

Ứng dụng AI trong tái chế hữu cơ

AI được sử dụng để tối ưu hóa quy trình ủ phân compost, dự đoán thành phần chất thải hữu cơ và điều chỉnh quá trình ủ nhằm tạo ra phân bón chất lượng cao, giảm thiểu các vấn đề về mùi hôi và hiệu suất xử lý (Fang et al., 2023).

Tích hợp IoT - AI trong Quản lý Chất thải Nông nghiệp Đô thị

Hệ thống quản lý chất thải thông minh có thể kết hợp IoT và AI để thu thập, phân tích dữ liệu và tối ưu hóa quy trình xử lý, đặc biệt trong thu gom chất thải hữu cơ từ nông nghiệp đô thị để tái chế thành phân bón hoặc biogas (Fang et al., 2023; Vishnu et al., 2021).

2.1.2.1. Sản xuất biogas: tiềm năng thu hồi năng lượng từ chất thải nông nghiệp

Việc tận dụng chất thải nông nghiệp để sản xuất biogas thông qua quá trình tiêu hóa kỵ khí được xem là một giải pháp hiệu quả trong quản lý chất thải đô thị và phát triển năng lượng tái tạo (Paritosh et al., 2017; Afolalu et al., 2021). Chất thải nông nghiệp và thực phẩm chứa hàm lượng hữu cơ cao, tạo điều kiện thuận lợi cho quá trình phân hủy sinh học, qua đó sản sinh biogas – hỗn hợp khí gồm chủ yếu methane (CH_4) và carbon dioxide (CO_2) (Paritosh et al., 2017).

Biogas có thể được sử dụng trong nhiều lĩnh vực khác nhau, bao gồm phát điện, cung cấp nhiệt và làm nhiên liệu thay thế, góp phần giảm sự phụ thuộc vào nhiên liệu hóa thạch (Afolalu et al., 2021; Tun et al., 2020). Đặc biệt, hệ thống đồng phát điện-nhiệt (CHP) giúp tối ưu hóa hiệu suất năng lượng, nâng cao giá trị sử dụng của biogas (Tun et al., 2020). Ngoài ra, sau quá trình tiêu hóa kỵ khí, phần cặn còn lại (digestate) có thể được sử dụng làm phân bón hữu cơ, giúp cải thiện độ phì nhiêu của đất và giảm nhu cầu sử dụng phân bón hóa học (Arancon et al., 2013; Tun et al., 2020).

Các nguồn chất thải nông nghiệp tiềm năng để sản xuất biogas bao gồm phụ phẩm trồng trọt (rơm rạ, vỏ trấu), chất thải từ chế biến thực phẩm (bã mía, vỏ trái cây, bã cà phê), chất thải chăn nuôi (phân gia súc) và chất thải thực phẩm từ hộ gia đình, nhà hàng, nhà máy chế biến (Afolalu et al., 2021; Paritosh et al., 2017). Nhiều quốc gia Đông Nam Á đã triển khai thành công mô hình sản xuất biogas từ chất thải nông nghiệp, góp phần vào an ninh năng lượng và giảm ô nhiễm môi trường (Tun et al., 2020).

Tuy nhiên, sản xuất biogas cũng gặp phải một số thách thức, đặc biệt là việc thu gom và vận chuyển chất thải nông nghiệp đến các cơ sở xử lý, do tính phân tán của nguồn phát sinh (Fang et al., 2023). Ngoài ra, hiệu suất sản xuất biogas phụ thuộc vào quá trình kiểm soát điều kiện lên men, đòi hỏi đầu tư vào công nghệ và hạ tầng phù hợp (Paritosh et al., 2017). Do đó, để thúc đẩy mô hình này tại TP.HCM, cần có chiến lược tích hợp quản lý chất thải nông nghiệp với công nghệ sản xuất biogas, hướng đến một hệ thống tuần hoàn và bền vững.

2.1.3. Các nghiên cứu điển hình quốc tế:

Singapore và ứng dụng kinh tế tuần hoàn trong quản lý chất thải nông nghiệp đô thị

Singapore đặt mục tiêu trở thành "quốc gia không chất thải", tập trung vào việc giảm thiểu và tái chế chất thải hữu cơ để tối ưu hóa tài nguyên và giảm áp lực lên không gian chôn lấp (Aardenburg, 2019). Nhờ vào chính sách quản lý chặt

chẽ và ứng dụng công nghệ tiên tiến, tỷ lệ tái chế chất thải hữu cơ tại Singapore cao hơn đáng kể so với nhiều quốc gia Đông Nam Á (Tun et al., 2020). Một trong những chiến lược quan trọng trong quản lý chất thải đô thị của Singapore là tích hợp công nghệ vào quá trình tái chế và chuyển hóa chất thải thực phẩm.

Hệ thống ủ phân compost và sản xuất khí sinh học là một giải pháp phổ biến được triển khai tại nhiều khách sạn, trường học và cơ sở thương mại nhằm chuyển đổi chất thải thực phẩm thành phân bón hữu cơ và năng lượng sinh học (Aardenburg, 2019). Ngoài ra, công nghệ tiêu hóa kỵ khí (Anaerobic Digestion - AD) đã được áp dụng để thu hồi khí metan (CH_4), sử dụng làm nhiên liệu tái tạo, đồng thời tạo ra phân bón giàu nitrat phục vụ sản xuất nông nghiệp đô thị (Gad et al., 2024). Đặc biệt, việc kết hợp xử lý bùn thải và chất thải thực phẩm giúp gia tăng sản lượng biogas, cung cấp nguồn điện cho hàng trăm nghìn hộ gia đình thông qua các nhà máy nhiệt điện kết hợp (Combined Heat and Power - CHP) (Aardenburg, 2019).

Bên cạnh đó, Singapore cũng thúc đẩy mô hình nông nghiệp đô thị thông minh, điển hình là hệ thống trang trại thẳng đứng "A-Go-Gro", trong đó chất thải hữu cơ được tái chế thành phân bón phục vụ sản xuất thực phẩm tại chỗ (Krishnamurthy, 2014). Trong bối cảnh hạn chế về không gian đô thị và đất nông nghiệp, việc tận dụng chất thải hữu cơ trong sản xuất nông nghiệp đóng vai trò quan trọng trong phát triển một hệ thống thực phẩm bền vững, giảm sự phụ thuộc vào nguồn phân bón hóa học và hỗ trợ chu trình tuần hoàn tài nguyên tại đô thị (Aardenburg, 2019).

Những mô hình và công nghệ trên cho thấy tiềm năng của việc áp dụng các giải pháp tuần hoàn trong quản lý chất thải nông nghiệp đô thị, không chỉ giúp giảm thiểu ô nhiễm mà còn góp phần tối ưu hóa chu trình dinh dưỡng trong đô thị, hướng tới một hệ thống quản lý chất thải hiệu quả và bền vững hơn.

Amsterdam và ứng dụng kinh tế tuần hoàn trong quản lý chất thải hữu cơ

Amsterdam cam kết trở thành một thành phố hoàn toàn tuần hoàn vào năm 2050, với trọng tâm là quản lý chất thải hữu cơ và thu hồi tài nguyên (Cao et al., 2022). Một trong những công nghệ được khuyến khích tại thành phố này là tiêu hóa kỵ khí (Anaerobic Digestion - AD), giúp xử lý chất thải thực phẩm và sản xuất biogas (Tonini et al., 2020). Việc thu gom riêng chất thải hữu cơ và xử lý bằng tiêu hóa kỵ khí kết hợp thu hồi dinh dưỡng và năng lượng đã được xác định là phương án tối ưu, tuy nhiên, chi phí thu gom vẫn là một rào cản lớn (Tonini et al., 2020).

Ngoài ra, Amsterdam cũng đang nghiên cứu thu hồi chất dinh dưỡng từ nước thải để ứng dụng trong nông nghiệp đô thị tích hợp trong tòa nhà (Building-Integrated Agriculture - BIA). Nghiên cứu ban đầu cho thấy tiềm năng sử dụng nước thải làm dung dịch dinh dưỡng cho cây trồng, nhưng cần điều chỉnh để đảm bảo hiệu quả (D'ostuni et al., 2023).

Thành phố cũng thử nghiệm các mô hình quản lý chất thải hữu cơ tiên tiến, bao gồm thu gom tận nhà, điểm thu gom thông minh và hậu cần thu hồi thông minh, nhằm nâng cao tỷ lệ tái chế và giảm lãng phí tài nguyên (Viva et al., 2020). Đặc biệt, các siêu thị và chợ đường phố được xác định là những điểm cần chú ý do lượng chất thải hữu cơ lớn mà chúng tạo ra.

Những sáng kiến trên cho thấy Amsterdam đang hướng tới một hệ thống quản lý chất thải đô thị bền vững, trong đó tái chế và tận dụng chất thải hữu cơ đóng vai trò quan trọng trong phát triển nông nghiệp đô thị và nền kinh tế tuần hoàn.

2.2. Phương pháp nghiên cứu

Nghiên cứu này áp dụng phương pháp phân tích dữ liệu thứ cấp, kết hợp giữa định tính và định lượng, nhằm đánh giá hệ thống quản lý chất thải nông nghiệp đô thị tại TP.HCM. Dữ liệu nghiên cứu được thu thập từ hai nguồn chính:

Tài liệu học thuật: Bao gồm các nghiên cứu đã công bố về quản lý chất thải nông nghiệp đô thị, ứng dụng công nghệ thông minh (IoT, AI) trong xử lý chất thải, và tiềm năng sản xuất biogas.

Nghiên cứu điển hình (Case studies): Phân tích các mô hình quản lý chất thải tiên tiến từ Singapore, Tokyo và Amsterdam, nhằm rút ra bài học kinh nghiệm và khả năng áp dụng tại TP.HCM.

Phương pháp phân tích dữ liệu

Dữ liệu được phân tích dựa trên ba phương pháp chính:

Phân tích so sánh (Comparative analysis): Đối chiếu mô hình quản lý chất thải nông nghiệp đô thị giữa TP.HCM và các thành phố có hệ thống tiên tiến, nhằm xác định các yếu tố khả thi có thể áp dụng.

Phân tích xu hướng (Trend analysis): Đánh giá sự thay đổi về lượng chất thải nông nghiệp đô thị theo thời gian, dựa

trên dữ liệu từ các nghiên cứu trước.

Đánh giá kinh tế - công nghệ (Techno-economic assessment): Phân tích chi phí - lợi ích của các giải pháp IoT, AI và sản xuất biogas, nhằm xác định mức độ hiệu quả và tính khả thi trong điều kiện TP.HCM.

Hạn chế của nghiên cứu

Do dựa trên dữ liệu thứ cấp, nghiên cứu có thể bị ảnh hưởng bởi độ cập nhật của thông tin và sự thiếu hụt dữ liệu thực tế tại TP.HCM. Ngoài ra, sự khác biệt về chính sách, cơ sở hạ tầng và điều kiện kinh tế giữa các thành phố có thể ảnh hưởng đến tính khả thi của việc áp dụng các mô hình tái chế chất thải nông nghiệp đô thị tại Việt Nam.

3. KẾT QUẢ VÀ THẢO LUẬN

Thực trạng quản lý chất thải nông nghiệp đô thị tại TP.HCM

TP.HCM đang chứng kiến sự gia tăng đáng kể về lượng chất thải nông nghiệp đô thị do tốc độ đô thị hóa và sự phát triển của hệ thống thực phẩm đô thị. Hiện nay, thành phố tạo ra trung bình 13.000 tấn chất thải sinh hoạt mỗi ngày, trong đó 50-60% là chất thải hữu cơ. Chất thải nông nghiệp đô thị cũng chiếm một tỷ lệ đáng kể, chủ yếu từ hoạt động trồng trọt và chế biến thực phẩm. Tuy nhiên, hệ thống thu gom và xử lý chưa đáp ứng đủ nhu cầu, khiến việc tái chế và tái sử dụng gặp nhiều khó khăn. Việc thu gom chất thải nông nghiệp chưa được tổ chức hiệu quả do nguồn phát sinh phân tán, đồng thời diện tích đất nông nghiệp suy giảm cũng ảnh hưởng đến khả năng tái sử dụng chất thải hữu cơ trong sản xuất nông nghiệp.

Ứng dụng công nghệ thông minh (IoT & AI) trong quản lý chất thải

Các nghiên cứu điển hình cho thấy IoT và AI có tiềm năng lớn trong việc tối ưu hóa quy trình thu gom và xử lý chất thải. IoT cho phép giám sát lượng chất thải theo thời gian thực thông qua các cảm biến thông minh, giúp tối ưu hóa lộ trình thu gom và giảm tình trạng quá tải. Các hệ thống như PBLMU và HBLMU sử dụng GPS để nâng cao hiệu suất vận hành. CloudSWAM hỗ trợ phân loại chất thải tại nguồn, tách biệt chất thải hữu cơ và chất thải tái chế. Trong khi đó, AI và học máy giúp tự động hóa phân loại chất thải, nâng cao hiệu suất tái chế hữu cơ, bao gồm cả ủ phân compost. AI còn hỗ trợ lập kế hoạch thu gom, dự báo lượng chất thải và bảo trì hệ thống xử lý, giúp nâng cao hiệu quả tổng thể của hệ thống quản lý chất thải.

Tiềm năng của biogas từ chất thải nông nghiệp đô thị

Chất thải nông nghiệp đô thị có tiềm năng lớn để sản xuất biogas thông qua tiêu hóa kỵ khí. Lượng chất thải hữu cơ cao tạo điều kiện thuận lợi cho quá trình này, giúp tận dụng nguồn tài nguyên và giảm thiểu ô nhiễm môi trường. Dù chưa có số liệu cụ thể về sản lượng năng lượng từ chất thải nông nghiệp đô thị tại TP.HCM, nhưng với lượng chất thải hữu cơ lớn, tiềm năng sản xuất biogas là rất đáng kể. Biogas không chỉ giúp giảm thiểu chất thải chôn lấp mà còn cung cấp nguồn năng lượng tái tạo, giảm sự phụ thuộc vào nhiên liệu hóa thạch. Việc áp dụng hệ thống đồng phát điện-nhiệt (CHP) có thể tối ưu hóa hiệu suất năng lượng, trong khi phần cặn sau tiêu hóa kỵ khí có thể được sử dụng làm phân bón hữu cơ, góp phần cải thiện độ phì nhiêu của đất.

Thách thức và rào cản chính sách

Mặc dù sản xuất biogas từ chất thải nông nghiệp đô thị có nhiều tiềm năng, việc triển khai vẫn gặp một số thách thức. Một trong những rào cản lớn nhất là hệ thống thu gom chưa hiệu quả, khiến việc vận chuyển chất thải nông nghiệp đến các cơ sở xử lý trở nên khó khăn. Hiệu suất sản xuất biogas phụ thuộc vào điều kiện lên men, đòi hỏi đầu tư vào công nghệ và hạ tầng phù hợp. Bên cạnh đó, chi phí thu gom và xử lý riêng biệt chất thải hữu cơ vẫn còn cao, cần có sự hỗ trợ từ chính sách và đầu tư công. Để hiện thực hóa tiềm năng này, TP.HCM cần xây dựng chiến lược tích hợp giữa quản lý chất thải nông nghiệp và sản xuất biogas, phát triển mô hình kinh tế tuần hoàn và nâng cấp cơ sở hạ tầng phù hợp. Và bước đầu cần có là việc thu thập số liệu cụ thể hơn về thành phần chất thải nông nghiệp đô thị tại TP.HCM, cần thực hiện các nghiên cứu và khảo sát chi tiết trong lĩnh vực này.

Những phát hiện trên nhấn mạnh tầm quan trọng của việc triển khai một hệ thống quản lý chất thải nông nghiệp đô thị thông minh và bền vững tại TP.HCM, dựa trên các nguyên tắc của kinh tế tuần hoàn và tận dụng tối đa tiềm năng công nghệ và năng lượng tái tạo.

4. KẾT LUẬN

TP.HCM đang đối mặt với thách thức lớn trong quản lý chất thải nông nghiệp đô thị, khi lượng chất thải hữu cơ ngày càng gia tăng nhưng hệ thống thu gom và xử lý hiện tại chưa đáp ứng hiệu quả. Mặc dù thành phố đã triển khai nhiều biện pháp như phân loại tại nguồn và tái chế, nhưng vẫn còn tồn tại những hạn chế về thu gom riêng, xử lý tập trung và ứng dụng công nghệ hiện đại.

Kết quả nghiên cứu chỉ ra rằng IoT có thể hỗ trợ giám sát và tối ưu hóa quy trình thu gom, trong khi AI giúp tự động hóa phân loại chất thải hữu cơ, góp phần nâng cao hiệu suất tái chế và giảm thiểu lượng chất thải chôn lấp. Ngoài ra, sản xuất biogas từ chất thải nông nghiệp không chỉ giúp thu hồi năng lượng tái tạo mà còn tạo ra phân bón hữu cơ, hỗ trợ phát triển nông nghiệp đô thị bền vững.

Tuy nhiên, việc triển khai các giải pháp này vẫn gặp nhiều rào cản, bao gồm chi phí đầu tư, hạ tầng chưa đồng bộ và sự thiếu hụt chính sách hỗ trợ. Do đó, TP.HCM cần xây dựng chiến lược quản lý chất thải nông nghiệp đô thị tích hợp, kết hợp giữa kinh tế tuần hoàn, công nghệ thông minh và sản xuất năng lượng tái tạo, nhằm giảm thiểu ô nhiễm, tối ưu hóa tài nguyên và thúc đẩy phát triển đô thị bền vững.

Việc thực hiện các giải pháp này không chỉ giúp nâng cao hiệu quả quản lý chất thải, mà còn định hướng TP.HCM trở thành một thành phố xanh, thông minh và tiên phong trong mô hình quản lý chất thải đô thị bền vững.

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TÍCH HỢP GIÁO DỤC VÌ SỰ PHÁT TRIỂN BỀN VỮNG VỚI PHÁT TRIỂN NĂNG LỰC SỐ TRONG DẠY HỌC TOÁN Ở TRUNG HỌC

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TÓM TẮT

Giáo dục vì sự phát triển bền vững (ESD) và phát triển năng lực số là hai xu hướng quan trọng trong giáo dục hiện đại. Một số nghiên cứu đã ghi nhận tác động tích cực của việc lồng ghép ESD với phát triển năng lực số trong dạy học Toán, đặc biệt trong các nội dung liên quan đến thống kê và phân tích dữ liệu. Bài viết này giới thiệu tiến trình dạy học một chủ đề Toán tích hợp ESD và năng lực số dành cho học sinh trung học – truy vết dấu chân sinh thái. Kết quả thực nghiệm cho thấy học sinh có những biểu hiện tích cực trong việc vận dụng công nghệ số để phân tích dữ liệu, đồng thời nâng cao được nhận thức về phát triển bền vững.

Từ khóa: Dạy học Toán; Giáo dục vì sự phát triển bền vững; Năng lực số.

1. GIỚI THIỆU

Hội nghị thượng đỉnh phát triển bền vững của Liên hợp quốc (LHQ) diễn ra tại trụ sở chính của LHQ ở New York (Mỹ) vào ngày 25-27/9/2015, đã thông qua Chương trình nghị sự phát triển bền vững toàn cầu gồm 17 mục tiêu phát triển bền vững đến năm 2030. Trong đó mục tiêu số 4 nhấn mạnh: "Đảm bảo một nền giáo dục hòa nhập, bình đẳng, chất lượng và cơ hội học tập suốt đời cho tất cả mọi người".

Ngày 03/6/2020, Thủ tướng Chính phủ đã ban hành Quyết định số 749/QĐ-TTg, phê duyệt "Chương trình Chuyển đổi số quốc gia đến năm 2025, định hướng đến năm 2030". Chuyển đổi số là một bước phát triển tất yếu của việc ứng dụng công nghệ thông tin nhằm làm thay đổi căn bản về công nghệ và tâm lý, tạo ra sự đột phá và chuyển đổi quy trình cả bên trong và bên ngoài của một đơn vị, xã hội. Quá trình này gồm 3 giai đoạn: 1. Số hóa thông tin (Digitization), 2. Số hoá quy trình (Digitalization) 3. Số hoá toàn diện hay còn gọi là Chuyển đổi số (Digital Transformation).

Trong kỷ nguyên công nghệ số, việc thực hiện mục tiêu 4 nói trên không thể tách rời khỏi việc chuyển đổi số trong giáo dục. Chỉ thị số 14/CT-TTg ngày 25/5/2021 về việc đẩy mạnh công tác khuyến học, khuyến tài xây dựng xã hội học tập giai đoạn 2021-2030 của chính phủ đặc biệt nhấn mạnh vào việc chuyển đổi số trong giáo dục, coi đó là một trong những nhiệm vụ trọng tâm và ưu tiên hàng đầu để xây dựng xã hội học tập trong giai đoạn mới. *Thực hiện đào tạo, tập huấn hướng nghiệp để học sinh có các kỹ năng sẵn sàng cho môi trường số* là một trong những nhiệm vụ, giải pháp quan trọng phát triển xã hội số trong Chương trình Chuyển đổi số quốc gia đến năm 2025, định hướng năm 2030. Báo cáo thường niên về chuyển đổi số của các nước thành viên ASEAN đặc biệt chú trọng đến vai trò của giáo dục – đào tạo đến *năng lực số* (NLS) của nguồn lao động nhằm đáp ứng những thay đổi trong nhu cầu về nhân lực của các cơ quan, tổ chức và doanh nghiệp (Chang, J. H.). Việc phát triển *năng lực số* cho người học là vấn đề trước mắt của nhà giáo dục, người đào tạo ra lực lượng lao động chất lượng cao cho tương lai của Việt Nam.

Trong chương trình Giáo dục phổ thông 2018, *năng lực tin học* có thể được xem như một phiên bản thu hẹp của *năng lực số* trong phạm vi giáo dục với các thành phần sau: sử dụng và quản lí các phương tiện công nghệ thông tin và truyền thông; ứng xử phù hợp trong môi trường số; giải quyết vấn đề với sự hỗ trợ của công nghệ thông tin và truyền thông; ứng dụng công nghệ thông tin và truyền thông trong học và tự học; hợp tác trong môi trường số. Bên cạnh đó, trong hầu hết các môn học đều hàm chứa những nội dung, cơ hội cho phép hình thành và phát triển năng lực số này. Môn Toán, với vai trò là môn học rèn luyện tư duy logic và khả năng giải quyết vấn đề, có nhiều tiềm năng để góp phần phát triển năng lực số cho HS. Các nội dung như thống kê, xác suất, mô hình hóa dữ liệu không chỉ giúp HS hiểu sâu hơn về toán học mà còn trang bị cho các em kỹ năng phân tích, xử lý và khai thác thông tin trong môi trường số.

Việc ban hành Chương trình giáo dục phổ thông 2018 là một phần quan trọng của kế hoạch Hành động quốc gia thực hiện chương trình nghị sự 2030 (Thủ tướng chính phủ, Quyết định số 622/QĐ-TTg). Trong đó, ở giai đoạn từ lớp 10 đến

12, HS bắt đầu có nhận thức về các vấn đề xã hội để có cái nhìn tổng quát trong quá trình lựa chọn nghề nghiệp. Biến đổi khí hậu, mất đa dạng sinh học hay sự nghèo đói và bất bình đẳng trong xã hội là những khái niệm mà HS cần được tiếp cận và tìm hiểu. Chương trình môn Toán chú trọng tính ứng dụng, gắn kết với thực tiễn và những vấn đề cấp thiệt có tính toàn cầu (như biến đổi khí hậu, phát triển bền vững, giáo dục tài chính…). Như vậy, định hướng giáo dục vì sự phát triển bền vững là một quan điểm dạy học tối ưu để đạt mục tiêu thứ tư - đảm bảo nền giáo dục có chất lượng, công bằng, toàn diện và thúc đẩy các cơ hội học tập suốt đời cho tất cả mọi người (Thủ tướng Chính phủ, 2017).

Trong phạm vi bài báo này, chúng tôi sẽ trình bày một phương án tích hợp giáo dục vì sự phát triển bền vững với phát triển năng lực số cho HS ơ cấp trung học phổ thông thông qua việc dạy học môn Toán và dự trên tham chiếu từ khung năng lực số cho HS phổ thông.

2. CÂU HỎI VÀ PHƯƠNG PHÁP NGHIÊN CỨU

Nghiên cứu nhằm giải quyết câu hỏi sau: Làm thế nào để lồng ghép giáo dục vì sự phát triển bền vững (GDPTBV) vào dạy học Toán đồng thời phát triển năng lực số cho HS?

Để trả lời cho câu hỏi nghiên cứu trên, chúng tôi thực hiện nghiên cứu cơ sở lí luận về giáo dục vì sự phát triển bền vững, năng lực số, kết hợp với phân tích chương trình môn Toán và các vấn đề bền vững hiện nay để tìm kiếm cơ hội tích hợp giáo dục vì sự phát triển bền vững với phát triển năng lực số trong dạy học Toán. Sau đó, chúng tôi tiến hành thực nghiệm sư phạm một chủ đề trong thời gian 4 tiết với 34 HS lớp 10 tại trường Trung học Thực hành Đại học Sư phạm, Thành phố Hồ Chí Minh.

Chúng tôi thu thập dữ liệu bằng cách quan sát, ghi chép, quay phim, chụp ảnh các buổi học; sản phẩm thu được gồm có câu trả lời và sản phẩm số là bài trình chiếu, video liên quan đến chủ đề *Phát triển bền vững* của HS. Bên cạnh đó để kết hợp đánh giá tính khả thi của chủ đề, chúng tôi đánh giá HS thông qua 10 câu hỏi dạng Likert thang điểm 10 và câu trả lời phỏng vấn về mức độ hứng thú của HS về nội dung.

3. KẾT QUẢ NGHIÊN CỨU

3.1. Giáo dục vì sự phát triển bền vững

Trong bối cảnh phát triển khoa học kỹ thuật, nhân loại đối mặt với nhiều thách thức thì phát triển bền vững trở thành mục tiêu hàng đầu cần được quan tâm đúng mức. Con người chính là trung tâm trong quá trình phát triển, do đó giáo dục có ý nghĩa quyết định đối với đối với việc đạt được phát triển bền vững. GDPTBV nhằm giúp người học có quyết định phù hợp và có trách nhiệm đối với sự toàn vẹn của môi trường, thức đẩy phát triển kinh tế và tạo dựng một xã hội công bằng cho thể hệ hiện tại và tương lai (UNESCO, 2013). GDPTBV là một thành phần không thể thiếu trong mục tiêu phát triển giáo dục chất lượng và là yếu tốt cốt lõi trong việc thực hiện tất cả các mục tiêu phát triển bền vững khác (UNESCO, 2018).

Hội nghị Thượng đỉnh Thế giới về phát triển bền vững (Rio+20) đã quyết định tăng cường GDPTBV và tích hợp nội dung phát triển bền vững vào các chương trình giáo dục (UN, 2012). GDPTBV nên được tích hợp vào toàn bộ chương trình giảng dạy. Nghĩa là GDPTBV nên được tiếp cận như một môn học đa ngành (Textbook for Sustainable development, 2017), tích hợp sâu vào tất cả các môn học, nằm ở trung tâm của chương trình giáo dục, không phải là phần bổ sung bên ngoài của chương trình học. Theo UNESCO, việc thực hiện giáo dục phát triển bền vững phải đảm bảo thực hiện được 2 khía cạnh cơ bản: thúc đẩy sự phát triển nhận thức của người học (đảm bảo kiến thức), và trau dồi các kĩ năng, kiến thức, thái độ và giá trị cần thiết để trở thành một người công dân có trách nhiệm và năng động. GDPTBV cần được tích hợp trong một chủ đề với nội dung gần gũi với HS và đề cập đến ba lĩnh vực kinh tế, xã hội và môi trường, trong đó HS có cơ hội được trải nghiệm, giải quyết vấn đề. (Khang, P. T., & Hòa, Q. M. (2024)). Ở Việt Nam, quyết định số 622/QĐ-TTg năm 2017 của Thủ tướng Chính phủ, về việc phê duyệt Kế hoạch hành động quốc gia cho Phát triển bền vững, có thể xem là nền tảng pháp lý vững chắc cho việc thúc đẩy các sáng kiến GDPTBV. Bộ Giáo dục và Đạo tào cũng đã triển khai quyết định số 2161/QĐ-BGDĐT, thiết lập kế hoạch chi tiết cho việc thực hiện các mục tiêu phát triển bền vững trong lĩnh vực giáo dục.

3.2. Năng lực số

3.2.1. Khái niệm "năng lực số"

Khái niệm "năng lực số" lần đầu tiên được đề cập vào năm 1997 bởi Gilster, là khả năng hiểu và sự dụng thông tin

dưới nhiều định dạng khác nhau từ nhiều nguồn khác nhau, được hiển thị qua máy tính (Nguyễn, T. X. (2023)).

Ủy ban và Nghị Viện Châu Âu (2006) cho rằng: "Năng lực số là một trong những năng lực cơ bản toàn diện (fundamental basic skill) và thiết yếu cho học tập suốt đời, trong đó năng lực ngày được định nghĩa là "Năng lực số liên quan đến việc sử dụng công nghệ số một cách tự tin và có tư duy phản biện phục vụ cho học tập, giải trí, công tác và giao tiếp. Năng lực số gồm những kỹ năng cơ bản về CNTT như: Sử dụng máy tính để tìm kiếm, tiếp cận, đánh giá, lưu trữ, tạo ra sản phẩm, trình bày và trao đổi thông tin, cũng như giao tiếp và tham gia vào các mạng lưới hợp tác thông qua Internet" (Bộ Giáo dục và Đào tạo, 2024).

Theo nghiên cứu tổng quan của UNESCO về khái niệm năng lực số từ các khuôn khổ liên quan của các cơ quan chính phủ và phi chính phủ, các khái niệm: "truy cập", "quản lý", "hiểu", "tích hợp", "truyền đạt", "đánh giá" và "tạo lập" được lặp lại liên tục. Từ đó, UNESCO đã đưa ra khái niệm về năng lực số như sau: "Năng lực số là khả năng truy cập, quản lý, hiểu, tích hợp, giao tiếp, đánh giá và sáng tạo thông tin một cách an toàn và phù hợp thông qua công nghệ kỹ thuật số để phục vụ cho thị trường lao động phổ thông (employment), các công việc cao cấp (decent jobs) (công việc có mức lương hợp lý, điều kiện an toàn, quyền lợi lao động và cơ hội phát triển) và khởi nghiệp kinh doanh. Năng lực này bao gồm các năng lực thường được biết đến như hiểu biết và sử dụng máy tính, hiểu biết về công nghệ thông tin, hiểu biết về thông tin hay hiểu biết về truyền thông" (UNESCO, 2018)

Theo Khung năng lực số dành cho HS phổ thông (Đề tài nghiên cứu của Bộ GDĐT, Viện Khoa học giáo dục Việt Nam phối hợp với UNICEF – 2022), năng lực số là khả năng sử dụng công nghệ số một cách tự tin, có trách nhiệm để học tập, làm việc và tham gia vào xã hội. Nó bao gồm: các kỹ năng về thông tin, dữ liệu, giao tiếp, hợp tác, sáng tạo nội dung số, an toàn, giải quyết vấn đề. (Bộ Giáo dục và Đào tạo, 2024).

3.2.2. Cấu trúc của một số khung "năng lực số"

Tầm quan trọng của năng lực số được thể hiện qua những nỗ lực của nhiều quốc gia trong việc xây dựng các khung năng lực số, các chương trình và kế hoạch để nâng cao kỹ năng số cho công dân. Mỗi quốc gia có mục tiêu khác nhau khi phát triển năng lực số.

Theo UNESCO, năng lực số gồm 7 nhóm năng lực chính, mỗi năng lực đều được chia thành các năng lực thành phần, trong đó tập trung theo các nhánh: hiểu biết, áp dụng và tạo ra nội dung mới. 7 nhóm năng lực bao gồm: Vận hành thiết bị và phần mềm; Năng lực thông tin và dữ liệu; Giao tiếp và hợp tác; Sáng tạo nội dung số; An ninh; Giải quyết vấn đề; Năng lực liên quan đến nghề nghiệp.

Tại Việt Nam, việc phát triển năng lực số cũng đang nhận được sự quan tâm sâu sắc rõ nét từ các cơ quan quản lý giáo dục. Từ việc nhận thấy được tầm quan trọng của năng lực số trong bối cảnh chuyển đổi số và hội nhập quốc tế, Bộ Giáo dục và Đào tạo đã ban hành thông tư số 02/2025/TT-BGDĐT quy định Khung năng lực số cho người học. Đây là một bước tiến quan trọng trong việc nâng cao chất lượng giáo dục và đào tạo nguồn nhân lực số trong thời đại công nghệ 4.0. Khung năng lực số cho người học ở Việt Nam kế thừa những nội dung cốt lõi từ khung năng lực số của UNESCO nhưng cũng có những điều chỉnh và bổ sung để phù hợp với bối cảnh giáo dục, văn hóa và yêu cầu thực tiễn tại Việt Nam. Khung năng lực số bao gồm 6 miền năng lực với 24 năng lực thành phần, được chia thành 4 trình độ từ cơ bản đến chuyên sâu theo 8 bậc.

3.3. Cơ hội tích hợp giáo dục vì sự phát triển bền vững với phát triển năng lực số trong dạy học Toán

Về định hướng từ chương trình:

Chương trình môn toán 2018 (trang 4) có đề cập đến một mục tiêu quan trọng là tính ứng dụng của Toán học vào thực tiễn bằng cách "gắn kết với thực tiễn […], gắn với xu hướng phát triển hiện đại của kinh tế, khoa học, đời sống xã hội và những vấn đề cấp thiết có tính toàn cầu (như biến đổi khí hậu, phát triển bền vững, giáo dục tài chính,...)". Tuy nhiên, kết quả khảo sát thực tiễn từ các bộ sách giáo khoa môn Toán theo chương trình 2018 cho thấy sự thiếu vắng các tình huống liên quan đến sự phát triển bền vững trong các hoạt động vận dụng. Có thể nói, mục tiêu tường minh nói trên mở ra cơ hội cho phép chúng tôi "nhúng" *giáo dục vì sự phát triển bền vững* vào dạy học toán bằng cách lồng ghép ngữ cảnh liên quan đến phát triển bền vững vào trong vấn đề của bài toán vận dụng thực tế.

Mỗi mạch kiến thức trong chương trình môn Toán cấp trung học đều có gợi ý cụ thể nội dung để triển khai phần "Thực hành trong phòng máy tính với phần mềm toán học (nếu nhà trường có điều kiện thực hiện)". Bên cạnh đó, "năng

lực sử dụng công cụ, phương triện học toán" là một trong một trong số năm năng lực toán học mà HS cần hình thành và phát triển qua việc giáo dục Toán. Nói cách khác, một biểu hiện về năng lực số của HS được đề cập ở đây dù thuật ngữ *năng lực số* còn đang ở dạng thức ngầm ẩn.

Hơn nữa, chương trình môn toán 2018 cũng đưa ra gợi ý về việc làm thế nào để triển khai mục tiêu đẩy mạnh tính ứng dụng của Toán vào thực tiễn nói trên. Đó là "*Điều này còn được thể hiện qua các hoạt động thực hành và trải nghiệm trong giáo dục toán học với nhiều hình thức như: thực hiện những đề tài, dự án học tập về Toán, đặc biệt là những đề tài và dự án về ứng dụng toán học trong thực tiễn; tổ chức trò chơi học toán, câu lạc bộ toán học, diễn đàn, hội thảo, cuộc thi về Toán,... tạo cơ hội giúp học sinh vận dụng kiến thức, kĩ năng và kinh nghiệm của bản thân vào thực tiễn một cách sáng tạo*." Hơn nữa, chương trình cũng dành thời lượng đáng kể cho *Hoạt động thực hành và trải nghiệm môn Toán* là 7% tổng số tiết (đối với cấp Trung học phổ thông) và cơ sở giáo dục còn được giao quyền chủ động lựa chọn nội dung khác so với đề xuất từ chương trình. Cụ thể là "*có thể bổ sung các hoạt động khác tuỳ vào điều kiện cụ thể*". (CTGDPT môn Toán, trang 24).

Như vậy, việc lồng ghép *giáo dục vì sự phát triển bền vững* có thể đưa vào trong quá trình dạy học toán qua ngữ cảnh của bài toán thực tiễn ở phần hoạt động vận dụng khi dạy học các tri thức toán phù hợp hoặc qua hoạt động thực hành trải nghiệm dưới dạng một dự án học tập.

Về định hướng từ UNESCO:

Định hướng từ chương trình hành động của UNESCO chỉ rõ cơ hội của môn Toán cho việc lồng ghép giáo dục vì sự phát triển bền vững gắn liền với chủ đề thống kê. Đây cũng là một mạch kiến thức mới và quan trọng trong chương trình mới. Hơn nữa, chủ đề thống kê cũng có những nội dung có thể khai thác rất tốt vai trò của yếu tố công nghệ thông tin để xử lí dữ liệu.

Quá trình xử phân tích dữ liệu bằng công cụ số nâng cao kỹ năng tổ chức, quản lý thông tin cũng như khả năng tạo lập nội dung số. Đồng thời, việc diễn giải và trình bày dữ liệu giúp HS phát triển tư duy phản biện, sáng tạo và giao tiếp hiệu quả trong môi trường số.

3.4. Tích hợp giáo dục vì sự phát triển bền vững với phát triển năng lực số trong dạy học

Chúng tôi lựa chọn các nội dung chủ đề mang tính thời sự, liên quan đến phát triển bền vững để tiến hành lồng ghép vào dạy học sẽ giúp cho học sinh có cơ hội biết đến những thách thức bền vững mà cá nhân loại đang đối mặt, từ đó có thể thay đổi nhận thức và hành động của của mỗi cá nhân, để giáo dục nuôi dưỡng những người tạo ra một xã hội bền vững.

3.4.1. Chủ đề đã được xây dựng

Mỗi con người sống trên Trái Đất đều có nhu cầu thực phẩm, nước cho sinh hoạt, gỗ để tạo ra các sản phẩm phục vụ con người, diện tích đất để xây dựng nhà ở, công viên, … Nhu cầu của mỗi cá thể đều cần một diện tích đất trồng cây trên hành tinh để bù đắp vào việc cân bằng lại lượng khí thải CO_2. Tuy nhiên, mức tiêu thụ của con người hiện nay đã vượt quá khả năng cung cấp của hành tinh.

Chỉ số dấu chân sinh thái và chỉ số sức tải sinh học xuất hiện như một chuẩn mực để đánh giá mức độ tác động của con người đến tự nhiên và tìm ra giải pháp để vừa đáp ứng được nhu cầu của con người vừa không gây ảnh hưởng lớn đến hệ sinh thái. "Dấu chân sinh thái" là tổng diện tích đất và nước có khả năng cho năng suất sinh học cần thiết để cung cấp tài nguyên mà con người tiêu thụ (thực phẩm, gỗ, năng lượng, bề mặt xây dựng cơ sở hạ tầng, ...) và hấp thụ chất thải mà con người sinh ra (Nguồn: Mạng lưới dấu chân toàn cầu – Global Footprint Network). Chỉ số Sức tải sinh học đo lường khả năng cung cấp, tái tạo tài nguyên và đồng hóa các chất thải của Trái đất. Chỉ số Dấu chân sinh thái thường so sánh với chỉ số Sức tải sinh học để làm rõ hơn "sức ép" của việc tiêu thụ và xả thải của con người lên tự nhiên, chúng cảnh báo rằng khi nào thì sự tiêu thụ này trở nên quá tải và gây ảnh hưởng xấu tới hành tinh của chúng ta.

Về định hướng giáo dục vì sự phát triển bền vững: trong hoạt động thực hành và trải nghiệm này, học sinh được tự "đo" dấu chân sinh thái và dấu chân Carbon của mình qua trang web https://www.footprintcalculator.org/home/en. Sau đó học sinh được đóng vai là nhà phân tích dữ liệu sử dụng thống kê để thu thập và phân tích Dấu chân của mẫu. Qua các con số từ website và các số đặc trưng của mẫu số liệu, HS có thể tự nhận ra rằng cá nhân nhỏ bé của mình và cộng đồng xung quanh đang có tác động rất lớn đến môi trường và thay đổi của bản thân cũng có thể giúp ích đến môi trường.

Về kiến thức toán cần vận dụng: học sinh vận dụng kiến thức Thống kê đã được tích lũy trong quá trình học Toán để giải quyết các nhiệm vụ, bài toán đặt ra trong hoạt động thực hành và trải nghiệm môn Toán.

Bảng 3.1. Mô tả tiến trình dạy học chủ đề truy vết dấu chân ứng với các thành phần của năng lực số được lựa chọn

Hoạt động	Nội dung của hoạt động	Thành phần năng lực số
HĐ1: HS tìm hiểu thông tin về Phát triển bền vững thông qua tài liệu đọc và xem qua video (ở nhà + trên lớp)	- GV cung cấp tài liệu đọc chủ đề Phát triển bền vững – Dấu chân sinh thái – Dấu chân Carbon. - HS trả lời 2 câu hỏi: 1. Phát triển bền vững là gì? Vì sao cần phải phát triển bền vững? 2. Dấu chấn sinh thái là gì? Dấu chân carbon là gì? - HS đại diện các nhóm trình bày nội dung đã tìm hiểu được ở phần về nhà bằng bài trình chiếu hoặc các thông tin trên các trang web.	1.2 Đánh giá dữ liệu, thông tin và nội dung số
HĐ2: Đo dấu chân sinh thái cá nhân và đề xuất biện pháp thu thập số liệu	- HS đo *dấu chân sinh thái* để nhận ra mức độ tác động của mỗi cá nhân lên môi trường qua việc trả lời các câu hỏi trên website: https://www.footprintcalculator.org/home, (HS được yêu cầu chụp màn hình kết quả các câu trả lời ở trên trang để lưu trữ thông tin) - Các nhóm thảo luận lựa chọn các thông tin để thu thập dữ liệu rồi thực hiện khảo sát trên website.	1.1.a. Xác định nhu cầu thông tin cần tìm của mình (đặt ra các tiêu chí cần thu thập số liệu về dấu chân sinh thái: Chỉ số dấu chân sinh thái, tỉ lệ của các thành phần dấu chân sinh thái, các thông số từ 15 câu hỏi). 1.1.b Tìm kiếm được dữ liệu, thông tin và nội dung số thông qua cách tìm kiếm đơn giản trong môi trường kĩ thuật số: Tìm kiếm được các số liệu từ trang trả kết quả đo dấu chân sinh thái. 1.1.c Biết cách truy cập dữ liệu, thông tin và nội dung này, và điều hướng giữa chúng: Ngoài việc thu thập số liệu cuối cùng, HS thu thập thêm các số liệu của 15 câu hỏi, sắp xếp để phân tích các nguyên nhân dẫn đến các chỉ số của thành phần sinh thái. 1.1.d Xác định các chiến lược tìm kiếm thông tin đơn giản: HS để xuất được cách lấy dữ liệu của 15 câu hỏi và sắp xếp lại một cách hợp lý.
HĐ3: Thu thập, xử lý số liệu Dấu chân sinh thái của 34 HS	1. Thu thập, phân loại số liệu Điều tra thu thập Dấu chân sinh thái và các thông tin liên quan của thành viên trong tổ và đưa dữ liệu lên sheet chung. 2. Mô tả và biểu diễn dữ liệu - Truy xuất dữ liệu về thông tin Your Ecological Footprint của 34 HS. - Biểu diễn dữ liệu dưới dạng Bảng số liệu thống kê. 3. Phân tích số liệu *Yêu cầu 1*: Tính các số đặc trưng đo xu thế trung tâm cho mẫu số liệu không ghép nhóm. *Yêu cầu 2*: Tính các số đặc trưng đo mức độ phân tán cho mẫu số liệu không ghép	1.2.a Thực hiện phân tích, so sánh và đánh giá tính xác thực và độ tin cậy của các nguồn dữ liệu, thông tin và nội dung số được xác định rõ ràng: - Thực hiến được việc thu thập, phân loại, so sánh, sắp xếp số liệu thống kê theo các tiêu chí cho trước. - Quan sát và phát hiện những điểm bất thường ở mẫu số liệu (nếu có) - Đọc mà mô tả được các số liệu biểu đồ quạt tròn và biểu đồ cột trong bảng kết quả ở trang web đo dấu chân sinh thái. 1.2.b. Phân tích, giải thích và đánh giá dữ liệu, thông tin và nội dung kỹ thuật số được xác định rõ ràng. - Sắp xếp và lựa chọn được các biểu diễn số liệu. Tính toán các số đặc trưng để từ đó rút ra các kết luận có nghĩa cho mẫu số liệu.

	nhóm *Yêu cầu 3*: Giải thích được ý nghĩa và vai trò của các số đặc trưng nói trên của mẫu số liệu Chỉ số dấu chân sinh thái. *Yêu cầu 4*: Đưa ra một vài giải pháp giảm thiểu Dấu chân sinh thái từ nhữngthông tin dữ liệu thu thập ở nhiệm vụ 1 (qua câu trả lời cá nhân của 34 HS) và các thông tin tìm hiểu thêm.	1.3.a Tổ chức, lưu trữ và truy xuất được các dữ liệu, thông tin và nội dung trong môi trường số. 1.3.b Tổ chức, xử lý và sử dụng hiệu quả công cụ số và thông tin tìm được để đưa ra những quyết định sáng suốt trong môi trường có cấu trúc. 2.1.a Hợp tác, chia sẻ được thông tin với các bạn trong nhóm để hoàn thành công việc được giao 2.1b. Thể hiện được sự hợp tác với người khác để giải quyết vấn đề cụ thể. 2.2a. *Lựa chọn được các công nghệ kỹ thuật số thích hợp được xác định rõ ràng để chia sẻ dữ liệu thông tin và nội dung kỹ thuật số*: HS chọn trao đổi thông tin qua các nền tảng giữa các thành viên trong nhóm (zalo, messenger) và trao đổi số liệu thu thập được giữa các nhóm trên Google trang tính. HS có thể sử dụng các chức năng cơ bản để tương tác. 2.2.b. *Giải thích được cách hoạt động như một bước trung gian để chia sẻ thông tin và nội dung thông qua các công nghệ kỹ thuật số được xác định rõ ràng và thường xuyên*: HS đặt ra quy tắc chung làm việc khi trao đổi thông tin. 2.4. *Lựa chọn và nêu rõ lý do chọn công cụ công nghệ số trong hoạt động hợp tác kiến tạo tài nguyên*: HS chọn Google Sheet và Google Drive để chia sẻ thông tin cho các quá trình hợp tác để tạo ra mẫu số liệu dùng chung.
HĐ4: Báo cáo kết quả.	Trình bày kết quả bằng bài trình chiếu/ Infographic/ Video. Yêu cầu: Trình bày tự do và phải làm cho người xem hiểu được vấn đề mà nhóm đang thực hiện (ví dụ như dẫn dắt, giải thích thông tin sơ lược về *Dấu chân sinh thái,...*)	3.1 Tạo và chỉnh sửa nội dung số ở các định dạng khác nhau. 3.2 Sửa đổi tinh chỉnh, cải tiến và tích hợp thông tin và nội dung vào kiến thức đã có nhằm tạo ra sản phẩm mới, nguyên bản và phù hợp. Trình bày và chia sử được ý tưởng thể hiện trong sản phẩm số đã tạo lập.

3.4.2. Thực nghiệm sư phạm

Dựa vào khung năng lực số tham khảo, chúng tôi phân tích biểu hiện năng lực số của HS trong 5 hoạt động cụ thể sau:

Hoạt động 1: Tìm hiểu các nội dung liên quan đến phát triển bền vững.

HS phát triển kĩ năng truy xuất, đánh giá và tổng hợp thông tin số khi tìm hiểu về phát triển bền vững và dấu chân sinh thái thông qua tài liệu được giáo viên cung cấp và tự tìm kiếm trên Internet. Các nhóm kiểm tra độ tin cậy của nguồn tài liệu, trích dẫn đúng quy cách và đánh giá chéo giữa các nhóm. Một số nhóm đã sử dụng Google Docs, Google Slides, Canva tạo bài trình chiếu, infographic hoặc video, giúp nâng cao khả năng sáng tạo nội dung số.

Các nhóm báo cáo tóm tắt về dấu chân sinh thái với kết quả 100% HS nêu được khái niệm phát triển bền vững và dấu chân sinh thái; 3 nhóm đã bổ sung thông tin từ các nguồn bên ngoài và trích dẫn đầy đủ; 1 nhóm đã dựng video bằng CapCut để truyền tải nội dung trực quan.





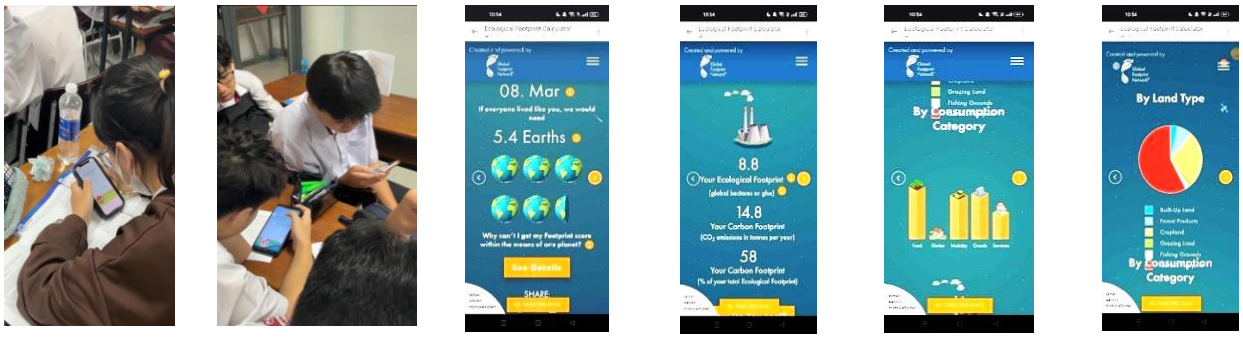




Hình 3.1 Sản phẩm (video/bài trình chiếu) của nhóm 1 về phát triển bền vững

Hoạt động 2: Đo dấu chân sinh thái cá nhân và đề xuất biện pháp thu thập số liệu

HS truy xuất, lưu trữ và quản lý dữ liệu số khi sử dụng trang web Footprint Calculator để đo dấu chân sinh thái cá nhân, chụp màn hình kết quả, lưu trữ vào thư mục Google Drive chung và thảo luận về các tiêu chí cần thu thập. Một số nhóm thể hiện tư duy phản biện qua việc đề xuất khảo sát mở rộng để có mẫu dữ liệu khách quan hơn. Cụ thể là ngoài việc thu thập số liệu về chỉ số *dấu chân sinh thái*, HS còn đề xuất thu thập thêm câu trả lời cho 15 câu hỏi mà trang web đã đưa ra để thu thập dữ liệu từ người tham gia rồi từ đó tính toán ra các thông số kết quả.

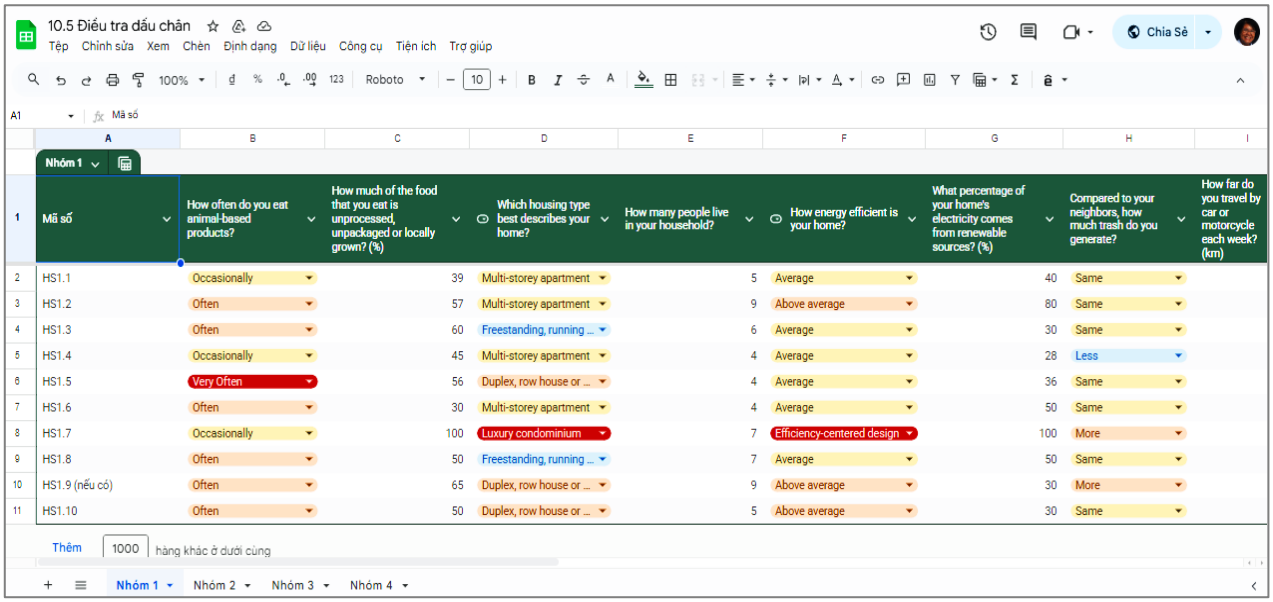


Hình 3.2 HS tự "đo" dấu chân sinh thái và kết quả trên website có tên Global footprint netwwork

HS tỏ ra tích cực và sôi nổi trong việc tự đo dấu chân sinh thái của mình, biết được các nhà nghiên cứu đã tính toán dấu chân sinh thái dựa trên những tiêu chí nào, từ đó có đề xuất cá nhân để giảm những tiêu chí mà bản thân mình đã sử dụng quá nhiều so với mặt bằng chung (số trung bình của tiêu chí này). Bước đầu, HS thể hiện được sự quan tâm và hứng thú của mình đối với chủ đề phát triển bền vững.

Hoạt động 3: Thu thập, xử lý số liệu Dấu chân sinh thái của 34 HS

Đối với hoạt động 3, HS đều xác định được nhu cần cần phải thống kê, điều tra *dấu chân*, tổ chức được dữ liệu sau khi đã tiến hành thu thập dữ liệu của tất cả 34 HS, thống nhất lựa chọn Google trang tính và Google Drive để chia sẻ thông tin khi hợp tác để tạo ra mẫu số liệu dùng chung và giải thích được lý do đã lựa chọn Google Trang tính là dữ liệu được trình bày dạng bảng và nhiều người có thể tạo lập dữ liệu chung



10.5 Điều tra dấu chân

Tệp Chỉnh sửa Xem Chèn Định dạng Dữ liệu Công cụ Tiện ích Trợ giúp

Chia Sẻ

	Mã số	How often do you eat animal-based products?	How much of the food that you eat is unprocessed, unpackaged or locally grown? (%)	Which housing type best describes your home?	How many people live in your household?	How energy efficient is your home?	What percentage of your home's electricity comes from renewable sources? (%)	Compared to your neighbors, how much trash do you generate?	How far do you travel by car or motorcycle each week? (km)
2	HS1.1	Occasionally	39	Multi-storey apartment	5	Average	40	Same	
3	HS1.2	Often	57	Multi-storey apartment	9	Above average	80	Same	
4	HS1.3	Often	60	Freestanding, running ...	6	Average	30	Same	
5	HS1.4	Occasionally	45	Multi-storey apartment	4	Average	28	Less	
6	HS1.5	Very Often	56	Duplex, row house or ...	4	Average	36	Same	
7	HS1.6	Often	30	Multi-storey apartment	4	Average	50	Same	
8	HS1.7	Occasionally	100	Luxury condominium	7	Efficiency-centered design	100	More	
9	HS1.8	Often	50	Freestanding, running ...	7	Average	50	Same	
10	HS1.9 (nếu có)	Often	65	Duplex, row house or ...	9	Above average	30	More	
11	HS1.10	Often	50	Duplex, row house or ...	5	Above average	30	Same	

Thêm 1000 hàng khác ở dưới cùng

Nhóm 1 Nhóm 2 Nhóm 3 Nhóm 4

Hình 3.3 Trang tính được các nhóm tạo lập dùng chung để thu thập dữ liệu của 34 HS

Sau đó, các nhóm tải mẫu dữ liệu dùng chung để phân loại, so sánh, sắp xếp số liệu thống kê theo các tiêu chí cho trước. Đặc biệt có 2 nhóm HS (nhóm 2 và nhóm 4), đã dùng phần mềm Excel để sắp xếp lại dữ liệu. Các nhóm HS đều giải quyết tốt các vấn đề (thu thập, xử lý số liệu tính toán) được đặt ra ở nhiệm vụ 1 và 2.

Hoạt động 4: Báo cáo kết quả

Các nhóm trình bày sản phẩm, trình bày lại định nghĩa về phát triển bền vững và dấu chân sinh thái, đồng thời cũng giải thích được vì sao cần dùng Toán thống kê, thu thập dữ liệu trong vấn đề này. Nhóm trình bày được quá trình thu thập và xử lý dữ liệu, các cách tính số đặc trưng đo xu thế trung tâm, ý nghĩa của các số đặc trưng đó và rút ra các kết luận có nghĩa về các vấn đề liên quan đến phát triển bền vững. HS lựa chọn số trung bình làm số đại diện cho dấu chân sinh thái của mẫu số liệu 34 HS để thấy được "sức ép" lên môi trường thiên nhiên.

Tư duy phản biện của HS được phát triển khi các HS truy xuất lại các câu trả lời trên website để phân tích nguyên nhân dẫn đến sự thiếu hụt sinh thái và còn biểu diễn số liệu bằng các biểu đồ để dễ quan sát và rút ra kết luận. Các nhóm đều đưa ra được các biện pháp nhằm giảm dấu chân sinh thái. Ngoài ra nhóm 4 còn đề xuất theo dõi sự thay đổi hành động của bản thân trong vòng 1 tháng để quan sát sự thay đổi chỉ số dấu chân sinh thái. Kỹ năng sáng tạo nội dung số để truyền tải thông điệp một cách hiệu quả thể hiện trên việc các nhóm sử dụng Google Docs, Google Slides, Canva để thiết kế infographic hoặc bài trình bày. Đặc biệt nhóm 1 sử dụng CapCut, iMovie để dựng video tuyên truyền ngắn. Một số nhóm chủ động lập Google Forms để khảo sát thói quen tiêu dùng của bạn bè, sau đó xử lý số liệu và so sánh với dữ liệu lớp học, thể hiện kỹ năng phân tích dữ liệu số ở mức độ cao.

3.5. Kết quả khảo sát sự hứng thú của người học đối với chủ đề

Sau thực nghiệm, chúng tôi tiến hành khảo sát các em HS thông qua 10 câu hỏi dạng Likert 10 mức độ và có điểm trung bình tương ứng như sau:

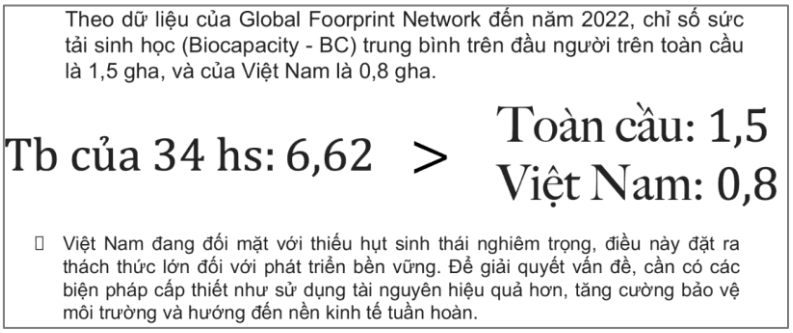
Câu hỏi	Điểm trung bình (thang điểm 10)
Em hứng thú với chủ đề bài học có liên quan đến phát triển bền vững.	9,12
Em hiểu và thực hiện tốt các nhiệm vụ học tập trong quá trình học.	7,94
Em hiểu được ý nghĩa của việc thống kê dấu chân sinh thái, dấu chân carbon và dự báo dân số.	9,5
Em hứng thú với việc được trực tiếp áp dụng kiến thức toán để giải quyết các vấn đề thực tiễn (thống kê, xử lý và đưa ra các kết luận có ý nghĩa về dấu chân, từ đó đưa ra được kết luận về thách thức của quá tải dân số đến phát triển bền vững).	8,71
Em hứng thú với việc được tìm hiểu các kiến thức liên quan đến dấu chân sinh thái và sự thiếu hụt sinh thái do quá tải dân số, đáp ứng mục tiêu phát triển bền vững.	8,74

Em thích được thảo luận và làm việc nhóm với mọi người trong quá trình học tập chủ đề này.	8,71
Em cảm thấy mình dễ dàng tiếp thu kiến thức cũng như nâng cao năng lực của mình với cách dạy học của chủ đề này.	8,76
Em hứng thú học với bài dạy này vì có liên quan đến môi trường.	9,21
Em cảm thấy hiểu biết của mình về phát triển bền vững được nâng cao.	9,38
Em sẵn sàng tham gia những tiết học có chủ đề tương tự.	9,09

Kết quả khảo sát cho thấy mức độ hứng thú của HS đối với chủ đề đạt mức cao vì điểm trung bình của hầu hết các câu hỏi đều trên 8 (thang điểm 10). Đặc biệt, các nội dung liên quan đến dấu chân sinh thái, dấu chân carbon và phát triển bền vững ghi nhận mức độ quan tâm cao (trung bình trên 9 điểm). HS cũng thể hiện sự hứng thú khi được áp dụng kiến thức toán vào giải quyết các vấn đề thực tiễn, cũng như mong muốn tiếp tục tham gia các tiết học có chủ đề tương tự trong tương lai.

Tuy nhiên, nội dung liên quan đến việc thực hiện nhiệm vụ học tập trong quá trình học có điểm trung bình thấp hơn (7,94). Kết quả phỏng vấn bổ sung cho thấy nguyên nhân chủ yếu đến từ khó khăn trong thao tác trên Google Trang tính dùng chung và thách thức trong giao tiếp nhóm khi làm việc trực tuyến. Điều này đặt ra vấn đề về việc cần tổ chức hướng dẫn kỹ năng sử dụng công cụ công nghệ và kỹ năng làm việc nhóm có thể được cải thiện để nâng cao hiệu quả học tập của HS.

Sự thay đổi nhận thức về phát triển bền vững và ứng dụng toán học cũng thể hiện qua phỏng vấn sau khi thực hiện chủ đề. Khi được hỏi "Hãy chia sẻ ba điều mà em tâm đắc nhất trong quá trình học chủ đề này?", đa phần các HS đều đề cập đến việc biết được bản thân đã sử dụng nhiều tài nguyên (có đôi khi lãng phí) như thế nào, và ảnh hưởng của việc làm đó đến môi trường; từ đó bản thân phải nên có những hành động cụ thể để bảo vệ hành tinh.



Hình 3.4 Trích slide báo cáo so sánh dấu chân sinh thái của 34 học sinh so với dấu chân sinh thái trung bình của Việt nam và thế giới

4. KẾT LUẬN

Nghiên cứu này đã thiết kế một kế hoạch cụ thể cho mô hình dạy học Toán tích hợp GDPTBV và phát triển NLS thông qua chủ đề truy vết dấu chân sinh thái. Kết quả cho thấy tính khả thi của việc có thể tích hợp GDPTBV vào dạy học cho HS trung học phổ thông. Nếu như việc dạy học các môn khoa học như Sinh học, Hóa học, Vật lý ở bậc phổ thông có thể tạo ra cơ hội cho HS tiếp cận và tập giải quyết một số vấn đề cụ thể liên quan đến sự biến đổi khí hậu, chế tạo vật liệu thân thiện và an toàn cho môi trường, xây dựng môi trường xanh với sự phát triển bền vững, … thì việc dạy học môn Toán ít có cơ hội như vậy. Tuy nhiên, ý thức của con người lại có tính tiên quyết vì nó dẫn dắt con người hành động. Ý thức đúng đắn sẽ là tiền để để dẫn đến hành động đúng đắn. Việc tham gia học tập chủ đề được xây dựng trong thực nghiệm đã tác động vào ý thức của HS thông qua nhận thức về dấu chân sinh thái của cá nhân mình, từ đó so sánh và nhận ra dấu chân của mình lớn hơn dấu chân sinh thái trung bình của Việt nam, của thế giới (được cung cấp trên website). Điều này đã thật sự tác động đến ý thức của các em HS. Hiệu ứng của kịch bản dạy học cũng cho thấy thêm rằng HS không chỉ nâng cao nhận thức về vấn đề cần bảo vệ môi trường mà còn phát triển kỹ năng thu thập, xử lý và phân tích dữ liệu bằng công cụ số, đồng thời cải thiện tư duy phản biện và khả năng giải quyết vấn đề. Việc tích hợp năng lực số vào dạy học Toán cũng giúp HS khai thác công nghệ để học tập hiệu quả hơn, đồng thời trang bị các kỹ năng cần thiết trong thời đại số. Nội dung thống kê và phân tích dữ liệu đã cho thấy lợi thế trong việc phát triển năng lực số của HS. Nghiên cứu này cũng khẳng định tiềm năng của giáo dục tích hợp trong đổi mới dạy học.

Chúng tôi cho rằng dạy học chủ đề về PTBV này có thể chuyển giao để khai thác ở khía cạnh về nguyên vật liệu (môn Công nghệ), về quy mô diện tích và phương thức phủ xanh của vùng miền theo địa phương (gắn với môn Sinh học, Địa lý), … Ngoài ra, nghiên cứu này cũng mở ra một hướng nghiên cứu mới về việc dạy học theo hình thức co-teaching, tức là kết hợp giáo viên Toán cùng dạy với giáo viên môn khoa học với các chủ đề khác, để tối ưu hóa sự kết hợp giữa Toán học, công nghệ số và các vấn đề về phát triển bền vững.

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HIỆN TƯỢNG NGHỈ VIỆC THẦM LẶNG TRONG BỐI CẢNH TOÀN CẦU: PHÂN TÍCH ĐA CẤP ĐỘ TỪ TÂM LÝ HỌC TỔ CHỨC VÀ ĐỀ XUẤT MÔ HÌNH LÝ THUYẾT TÍCH HỢP

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TÓM TẮT

Hiện tượng nghỉ việc thầm lặng – giảm đầu tư cảm xúc, nhận thức và hành vi vào công việc – gia tăng trong bối cảnh toàn cầu hậu đại dịch. Nghiên cứu phân tích tổng quan hệ thống (PRISMA) 32 nghiên cứu đa quốc gia để đánh giá hiệu quả giải thích của các mô hình JD-R và thuyết tự quyết. Kết quả chỉ ra hạn chế của các mô hình này trong phản ánh tương tác đa cấp giữa cá nhân, tổ chức và yếu tố vĩ mô, đặc biệt dưới tác động của COVID-19. Từ khoảng trống lý thuyết, nghiên cứu đề xuất mô hình động lực phản chiếu gồm ba khía cạnh: (1) cá nhân (trí tuệ cảm xúc, động lực nội tại); (2) tổ chức (văn hóa phản hồi, phong cách lãnh đạo); và (3) yếu tố toàn cầu (chênh lệch chính sách, áp lực linh hoạt hóa). Nghỉ việc thầm lặng được lý giải là cơ chế tự bảo vệ trước sự mất cân bằng giữa nguồn lực cá nhân và áp lực môi trường. Nghiên cứu gợi mở hướng tiếp cận đa chiều cho quản trị nhân sự và nghiên cứu thực nghiệm tiếp theo.

Từ khóa: Động lực nội tại, mô hình động lực phản chiếu, nghỉ việc thầm lặng, tâm lý học Tổ chức, trí tuệ cảm xúc

1. GIỚI THIỆU (INTRODUCTION)

1.1. Bối cảnh

Trong bối cảnh toàn cầu hậu COVID-19, hiện tượng nghỉ việc thầm lặng đã trở thành vấn đề nghiêm trọng khi mức độ gắn kết của lực lượng lao động giảm sút đáng kể. Gallup (2021) cho biết chỉ khoảng 20% nhân viên đạt mức gắn kết cao, trong khi McKinsey & Company (2022) báo cáo rằng những thay đổi trong cách thức làm việc sau đại dịch đã làm gia tăng xu hướng nghỉ việc thầm lặng. Tại Việt Nam, sự tham gia mạnh mẽ của làn sóng thế hệ Z (Gen Z) - thường được định nghĩa là nhóm nhân khẩu học gồm những người sinh từ giữa những năm 1997 đến đầu những năm 2012, là thế hệ đầu tiên lớn lên với sự tiếp cận toàn diện với công nghệ số và Internet (Dimock, 2019), vào thị trường lao động càng làm nổi bật tính cấp thiết của vấn đề. Các khảo sát nội bộ chỉ ra rằng tỷ lệ gắn kết của nhân viên, đặc biệt là nhóm Gen Z, chỉ đạt khoảng 30% (Nguyễn, Lê, & Trần, 2021; Phạm & Hoàng, 2020). Sự giảm sút này không chỉ ảnh hưởng tiêu cực đến hiệu suất làm việc mà còn gây khó khăn trong việc duy trì sự ổn định và phát triển bền vững của tổ chức (Đặng, 2021). Những số liệu này nhấn mạnh nhu cầu cấp bách nghiên cứu nghỉ việc thầm lặng và đề xuất các giải pháp quản trị nhân sự hiệu quả trong bối cảnh hội nhập quốc tế và biến đổi môi trường làm việc hiện đại.

1.2. Vấn đề nghiên cứu

Các lý thuyết truyền thống trong tâm lý học tổ chức, điển hình như mô hình JD-R của Bakker & Demerouti (2007) và thuyết tự quyết của Deci & Ryan (1985), đã được áp dụng rộng rãi để giải thích các hiện tượng liên quan đến động lực làm việc và gắn kết nhân viên. Tuy nhiên, trong bối cảnh toàn cầu hóa và đa văn hóa hiện nay, các khung lý thuyết này chủ yếu tập trung vào các yếu tố nội tại của cá nhân và các đặc điểm tổ chức, trong khi chưa tích hợp đầy đủ các yếu tố vĩ mô như chính sách lao động quốc tế và biến động kinh tế – xã hội (McKinsey & Company, 2022; Kalleberg, 2018). Hơn nữa, những biến đổi sâu sắc trong môi trường làm việc sau đại dịch COVID-19 đã tạo ra nhu cầu tái đánh giá các mô hình hiện có (Gallup, 2021; OECD, 2020). Bên cạnh đó, các nghiên cứu về quản trị nhân sự cũng đã chỉ ra tầm quan trọng của việc kết hợp các yếu tố lãnh đạo và văn hóa tổ chức trong việc thúc đẩy sự gắn kết (Hartel, 2019; Vandenberghe & Tremblay, 2008). Tuy nhiên, hiện chưa có mô hình nào tích hợp đồng thời cả ba khía cạnh: cá nhân, tổ chức và yếu tố toàn cầu, nhằm giải thích một cách toàn diện hiện tượng nghỉ việc thầm lặng.

Do đó, cần thiết phải phát triển một mô hình lý thuyết tích hợp, kết hợp các yếu tố: (1) cá nhân – bao gồm trí tuệ cảm xúc và động lực tự chủ; (2) tổ chức – văn hóa phản hồi và phong cách lãnh đạo; và (3) yếu tố toàn cầu – phản ánh chênh lệch chính sách lao động và áp lực linh hoạt hóa. Mô hình tích hợp này hứa hẹn cung cấp một khung phân tích toàn diện,

từ đó định hướng các nghiên cứu thực nghiệm và đề xuất giải pháp quản trị nhân sự hiệu quả trong môi trường toàn cầu đa văn hóa.

1.3. Mục tiêu và câu hỏi nghiên cứu

1.3.1. Mục tiêu nghiên cứu

Tổng hợp và hệ thống hóa các lý thuyết nền tảng liên quan đến động lực làm việc và gắn kết nhân viên, qua đó làm rõ các khái niệm cơ bản liên quan đến hiện tượng nghỉ việc thầm lặng.

Phân tích các khoảng trống lý thuyết của các mô hình truyền thống như JD-R và thuyết tự quyết trong bối cảnh đa văn hóa và toàn cầu hóa, đặc biệt dưới tác động của các yếu tố vĩ mô (chính sách lao động quốc tế, biến động kinh tế – xã hội).

Đề xuất một mô hình lý thuyết tích hợp, kết hợp:

– Yếu tố cá nhân (trí tuệ cảm xúc, động lực nội tại),

– Yếu tố tổ chức (văn hóa phản hồi, phong cách lãnh đạo), và

– Yếu tố toàn cầu (chênh lệch chính sách lao động, áp lực linh hoạt hóa), để giải thích nghỉ việc thầm lặng một cách toàn diện và định hướng các nghiên cứu thực nghiệm, từ đó góp phần xây dựng các giải pháp quản trị nhân sự hiệu quả.

1.3.2. Câu hỏi nghiên cứu

Các lý thuyết nền tảng giải thích hiện tượng nghỉ việc thầm lặng như thế nào và những hạn chế của chúng là gì trong bối cảnh toàn cầu hóa và đa văn hóa?

Những khoảng trống lý thuyết nào tồn tại khi áp dụng các mô hình JD-R và thuyết tự quyết vào việc giải thích hiện tượng nghỉ việc thầm lặng, đặc biệt khi xem xét các yếu tố vĩ mô?

Làm thế nào để tích hợp các yếu tố cá nhân, tổ chức và toàn cầu vào một mô hình lý thuyết mới nhằm cung cấp một giải thích toàn diện cho hiện tượng nghỉ việc thầm lặng?

Mô hình lý thuyết mới đề xuất sẽ đóng góp như thế nào cho việc định hướng nghiên cứu thực nghiệm và phát triển các giải pháp quản trị nhân sự trong môi trường đa văn hóa toàn cầu?

2. TỔNG QUAN LÝ THUYẾT (THEORETICAL FRAMEWORK)

2.1. Định nghĩa, diễn biến lịch sử, bối cảnh xuất hiện và đặc điểm của nghỉ việc thầm lặng

2.1.1. Định nghĩa nghỉ việc thầm lặng

Theo góc độ tâm lý học tổ chức, các học giả đã đề cập đến hiện tượng này từ rất sớm dưới dạng khái niệm "rút lui khỏi vai trò công việc" (role withdrawal) – một khái niệm được giới thiệu bởi Kahn (1990) nhằm mô tả hành vi của nhân viên khi không đầu tư đầy đủ về mặt cảm xúc, nhận thức và hành vi vào công việc vượt qua yêu cầu cơ bản. Mặc dù khái niệm này đã tồn tại từ lâu nhưng khái niệm "quiet quitting – nghỉ việc thầm lặng" chỉ hiện tượng tương tự mới được phổ biến rộng rãi trong những năm gần đây, đặc biệt từ 2021-2022.

Từ góc độ quản trị nhân sự, hiện tượng này được xem như hành vi giới hạn nỗ lực làm việc, thể hiện qua việc từ chối làm thêm giờ, không tham gia các dự án mới và giảm tương tác với đồng nghiệp (Gallup, 2022).

Góc độ xã hội học lại nhấn mạnh rằng nghỉ việc thầm lặng phản ánh sự thay đổi trong quan niệm lao động của các thế hệ trẻ, khi cân bằng giữa công việc và sức khỏe tinh thần được ưu tiên hơn so với sự cống hiến tuyệt đối cho công việc (McKinsey & Company, 2023).

Trong bài nghiên cứu này, tác giả lựa chọn định nghĩa theo góc độ tâm lý học tổ chức của Kahn (1990) làm hướng đi chính. Theo đó, khái niệm nghỉ việc thầm lặng (quiet quitting) được hiểu là *hành vi của nhân viên khi không đầu tư đầy đủ về mặt cảm xúc, nhận thức và hành vi vào công việc, chỉ hoàn thành những nhiệm vụ tối thiểu mà không cam kết vượt ra phạm vi công việc theo hợp đồng.* Đồng thời, khái niệm này cũng nhằm nhấn mạnh quá trình rút lui khỏi vai trò công việc như một cơ chế ứng phó đối với áp lực và kiệt sức. Lựa chọn định nghĩa này không những phù hợp với mục tiêu phát triển mô hình lý thuyết tích hợp nhằm giải thích hiện tượng nghỉ việc thầm lặng trong bối cảnh toàn cầu hóa và đa văn hóa, mà còn tạo nền tảng vững chắc cho các nghiên cứu trong tương lai.

2.1.2. Diễn biến và bối cảnh xuất hiện của nghỉ việc thầm lặng

Trước COVID-19:

Trước đại dịch, hiện tượng nghỉ việc thầm lặng đã được đề cập gián tiếp thông qua các nghiên cứu về sự thờ ơ trong công việc (work apathy), việc rút lui khỏi vai trò công việc (role withdrawal) và hiện tượng có mặt nhưng không đạt hiệu suất (presenteeism), mặc dù khái niệm nghỉ việc thầm lặng chưa được định hình một cách rõ ràng (Johns, 2010). Trong giai đoạn này, các nghiên cứu chủ yếu tập trung vào việc đo lường mức độ thờ ơ và hiệu suất làm việc thấp, thay vì đặt trọng tâm vào nghỉ việc thầm lặng như một khái niệm riêng biệt.

Trong COVID-19:

Trong giai đoạn đại dịch năm 2020, sự phổ biến của hình thức làm việc từ xa đã làm mờ ranh giới giữa công việc và cuộc sống cá nhân, dẫn đến sự gia tăng của hiện tượng kiệt sức và giảm động lực làm việc (World Health Organization [WHO], 2021). Sự thay đổi đột ngột này tạo ra một môi trường thuận lợi cho việc bộc lộ hiện tượng nghỉ việc thầm lặng, khi nhân viên phải đối mặt với áp lực tâm lý gia tăng và sự biến đổi nhanh chóng trong cách thức làm việc.

Sau COVID-19:

Trong bối cảnh sau đại dịch, hiện tượng nghỉ việc thầm lặng không chỉ được duy trì mà còn gia tăng rõ rệt do sự thay đổi trong giá trị lao động. Thế hệ trẻ, đặc biệt là Gen Z, đòi hỏi môi trường làm việc linh hoạt, minh bạch và chú trọng toàn diện về sức khỏe lẫn tinh thần (well-being), qua đó dẫn đến gia tăng tỷ lệ nhân viên chỉ hoàn thành nhiệm vụ tối thiểu (Gallup, 2022). Hơn nữa, việc lan truyền mạnh mẽ các cụm từ (hashtag) #QuietQuitting trên các nền tảng truyền thông xã hội như TikTok và LinkedIn từ giữa năm 2022 đã góp phần biến nghỉ việc thầm lặng thành một xu hướng toàn cầu (Klotz et al., 2023). Đồng thời, bối cảnh kinh tế – xã hội với áp lực lạm phát và những biến động mạnh mẽ do tác động của công nghệ tiếp tục làm nổi bật vấn đề nghỉ việc thầm lặng, nhấn mạnh tính cấp thiết của việc tích hợp các yếu tố vĩ mô trong nghiên cứu và quản trị nhân sự (World Economic Forum, 2023; SHRM, 2023).

2.1.3. Đặc điểm của nghỉ việc thầm lặng

Giảm gắn kết cảm xúc (Emotional Disengagement): nghỉ việc thầm lặng thể hiện rõ qua sự suy giảm gắn kết cảm xúc với tổ chức. Nhân viên không còn cảm thấy tự hào về công việc hoặc đồng nhất với giá trị doanh nghiệp (Kahn, 1990). Nghiên cứu của Gallup (2022) chỉ ra rằng 59% nhân viên toàn cầu trải nghiệm trạng thái không gắn kết (not engaged), biểu hiện qua thái độ thờ ơ trong các cuộc họp, thiếu sáng kiến và phản ứng tiêu cực với nhiệm vụ phức tạp.

Hành vi hoàn thành tối thiểu (Minimum Effort Compliance): Nhân viên tuân thủ mức độ công việc tối thiểu theo hợp đồng, từ chối các nhiệm vụ vượt quá phạm vi hoặc đòi hỏi sáng tạo. Khảo sát của McKinsey & Company (2023) trên 12.000 lao động Gen Z cho thấy 50% chỉ tập trung vào công việc được trả lương, không tự nguyện đóng góp thêm. Điều này phản ánh xu hướng giới hạn nỗ lực (effort boundaries) để bảo vệ sức khỏe tinh thần (WHO, 2021).

Hạn chế tương tác xã hội (Social Withdrawal): nghỉ việc thầm lặng đi kèm với giảm tương tác xã hội trong môi trường làm việc. Nhân viên tránh tham gia hoạt động nhóm, hạn chế giao tiếp với đồng nghiệp và cấp trên (Klotz et al., 2023). Johns (2010) lý giải đây là hành vi né tránh xung đột vai trò (role conflict) và áp lực đa nhiệm, dẫn đến việc tự cô lập để giảm căng thẳng.

Thiết lập ranh giới công việc và cuộc sống (Work-Life Boundary Rigidity): Nhân viên áp dụng ranh giới cứng nhắc giữa công việc và đời sống cá nhân. Ví dụ, từ chối làm thêm giờ, không trả lời email ngoài giờ làm việc hoặc ngừng sử dụng thiết bị công nghệ liên quan đến công việc sau giờ hành chính (SHRM, 2023). Gallup (2022) ghi nhận 67% lao động trẻ ưu tiên cân bằng giữa công việc và cuộc sống (work-life balance) hơn thăng tiến, phản ánh sự thay đổi trong hệ giá trị lao động thế hệ.

Phản ứng thụ động với thay đổi tổ chức (Passive Resistance): nghỉ việc thầm lặng thường biểu hiện qua thái độ thụ động trước các thay đổi tổ chức. Nhân viên không phản đối trực tiếp nhưng từ chối hợp tác, thể hiện qua việc im lặng trong các cuộc họp triển khai chính sách hoặc không đóng góp ý kiến cải tiến (Klotz et al., 2023). Đây được xem là hình thức phản kháng ngầm (covert resistance) nhằm duy trì trạng thái cân bằng tâm lý.

Gia tăng hành vi chống đối ngầm (Subtle Counterproductive Behaviors): nghỉ việc thầm lặng có thể tiến triển thành các hành vi chống đối tinh vi như chậm tiến độ, quên tham gia đào tạo hoặc thể hiện thái độ thiếu tôn trọng qua ngôn ngữ cơ thể (không giao tiếp bằng mắt). WHO (2021) chỉ ra rằng đây là cơ chế tự bảo vệ khi nhân viên cảm thấy thiếu công bằng hoặc bị kiểm soát trong công việc.

Các đặc điểm trên không chỉ phản ánh hành vi cá nhân mà còn là tín hiệu cảnh báo về văn hóa tổ chức. Chúng cho thấy sự thiếu hụt trong chính sách quản lý nhân sự, đặc biệt trong bối cảnh toàn cầu hóa và đa dạng văn hóa (World Economic Forum, 2023). Việc nhận diện sớm các biểu hiện nghỉ việc thầm lặng giúp tổ chức xây dựng chiến lược can thiệp hiệu quả, cân bằng giữa hiệu suất và phát triển toàn diện về sức khỏe lẫn tinh thần cho nhân viên.

2.2. Các lý thuyết liên quan trong tâm lý học tổ chức

2.2.1. Lý thuyết động lực làm việc

Lý thuyết hai nhân tố của Herzberg (1959) cho rằng động lực làm việc phụ thuộc vào hai nhóm nhân tố: (1) nhân tố duy trì (lương, điều kiện làm việc) và (2) nhân tố động viên (sự công nhận, cơ hội phát triển). Trong bối cảnh nghỉ việc thầm lặng, việc tổ chức chỉ tập trung vào nhân tố duy trì (tăng lương) mà bỏ qua động viên (thiếu đào tạo) dẫn đến trạng thái "không bất mãn nhưng không gắn kết" – tiền đề cho nghỉ việc thầm lặng (Gallup, 2022). Tuy nhiên, lý thuyết này chưa tính đến yếu tố vĩ mô như chính sách lao động toàn cầu hoặc tác động của đại dịch lên kỳ vọng nhân viên.

Lý thuyết tự quyết (SDT; Deci & Ryan, 1985) nhấn mạnh ba nhu cầu tâm lý cốt lõi thúc đẩy động lực nội tại: tự chủ, năng lực và kết nối. Khi tổ chức áp đặt quy trình cứng nhắc (hạn chế tự chủ), thiếu hỗ trợ phát triển (giảm năng lực) hoặc văn hóa thiếu gắn kết (suy yếu kết nối), nhân viên chuyển sang hành vi tối thiểu hóa nỗ lực (Ryan & Deci, 2020). Dù vậy, SDT chủ yếu tập trung vào cá nhân, bỏ qua áp lực từ xu hướng làm việc linh hoạt và biến động kinh tế toàn cầu.

2.2.1. Mô hình gắn kết nhân viên

Mô hình gắn kết nhân viên của Kahn (1990) định nghĩa gắn kết là sự đầu tư toàn diện về cảm xúc, nhận thức và hành vi vào công việc, đòi hỏi ba điều kiện: ý nghĩa, an toàn và sẵn sàng. Nghỉ việc thầm lặng phản ánh sự rút lui tâm lý khi một trong ba điều kiện này bị suy giảm. Ví dụ, nhân viên không tìm thấy ý nghĩa trong công việc do thiếu kết nối với giá trị tổ chức hoặc cảm thấy bất an trước văn hóa đổ lỗi (Kahn, 1990). Tuy nhiên, mô hình chưa đề cập đến tác động của công nghệ và làm việc từ xa – yếu tố then chốt trong bối cảnh hậu đại dịch.

2.2.3. Lý thuyết kiệt sức nghề nghiệp

Lý thuyết kiệt sức nghề nghiệp (Maslach & Jackson, 1981) xác định kiệt sức gồm ba thành phần: kiệt quệ cảm xúc, thờ ơ và giảm hiệu suất. Kiệt sức được coi là tiền đề trực tiếp của nghỉ việc thầm lặng, khi nhân viên sử dụng nghỉ việc thầm lặng như cơ chế đối phó với căng thẳng (Maslach & Leiter, 2016). Ví dụ, áp lực đa nhiệm dẫn đến kiệt quệ cảm xúc, thúc đẩy hành vi giới hạn nỗ lực (WHO, 2021). Tuy nhiên, lý thuyết chưa lý giải nghỉ việc thầm lặng như một chiến lược chủ động trong môi trường lao động hiện đại, nơi nhân viên tái ưu tiên cân bằng cuộc sống.

2.3. Các nghiên cứu đã có về nghỉ việc thầm lặng

2.3.1. Các nghiên cứu trên thế giới về nghỉ việc thầm lặng

Nghiên cứu định lượng:

Gallup (2022) khảo sát 160.000 nhân viên ở 100 quốc gia bằng thang đo gắn kết Q12 cho thấy 59% lao động toàn cầu ở trạng thái "không gắn kết", trong đó 18% biểu hiện nghỉ việc thầm lặng. Ngoài ra, mối tương quan âm giữa lãnh đạo độc đoán và mức độ gắn kết ($r = -0.62$, $p < 0.01$) được ghi nhận, mặc dù nghiên cứu này không đo lường yếu tố cá nhân như trí tuệ cảm xúc.

McKinsey & Company (2023) khảo sát 15.000 Gen Z tại Mỹ và châu Âu, sử dụng phân tích hồi quy đa biến, cho thấy 40% Gen Z chỉ thực hiện công việc tối thiểu, với thiếu cơ hội phát triển ($\beta = 0.34$) và lãnh đạo cứng nhắc ($\beta = 0.28$) là các biến tiên lượng mạnh của nghỉ việc thầm lặng. Bên cạnh đó, Baker, Smith, & Johnson (2022) cũng chỉ ra rằng quá trình chuyển đổi số và làm việc từ xa đã góp phần gia tăng các biểu hiện nghỉ việc thầm lặng trong ngành công nghệ, mặc

dù nghiên cứu của họ chưa xem xét sự đa dạng văn hóa.

Parker et al. (2022) chỉ ra rằng bất ổn kinh tế và sự khác biệt về chính sách lao động có tác động đáng kể đến nghỉ việc thầm lặng, đặc biệt trong các ngành công nghiệp chịu ảnh hưởng mạnh của chuyển đổi số. Allen và Bryant (2022) nhận định rằng nghỉ việc thầm lặng phổ biến hơn trong môi trường làm việc có văn hóa cá nhân chủ nghĩa, trong khi các tổ chức áp dụng các chính sách linh hoạt và phong cách lãnh đạo khuyến khích sự tham gia lại có xu hướng ghi nhận mức độ nghỉ việc thầm lặng thấp hơn. Hơn nữa, Smith và Lee (2022), qua phân tích hồi quy đa biến, đã xác định rằng thiếu cơ hội phát triển cá nhân ($\beta = 0.34$) và lãnh đạo cứng nhắc ($\beta = 0.28$) là các biến tiên lượng mạnh đối với nghỉ việc thầm lặng, đặc biệt trong bối cảnh hậu đại dịch. Bên cạnh đó, mặc dù nghiên cứu của Fugate, Kinicki và Ashforth (2004) không tập trung trực tiếp vào nghỉ việc thầm lặng, kết quả của họ cho thấy thái độ thờ ơ trong công việc có mối tương quan âm với hiệu suất làm việc và tự tin nghề nghiệp, từ đó gợi ý rằng sự suy giảm năng lực và tăng mức độ hoài nghi có thể là tiền đề dẫn đến nghỉ việc thầm lặng.

Torres & Smith (2023) sử dụng mô hình phân tích đa cấp, nghiên cứu này cho thấy nghỉ việc thầm lặng có mối liên hệ mật thiết với mức độ sử dụng công nghệ trong công việc. Kết quả chỉ ra rằng sự gia tăng của các công cụ số và tự động hóa có thể làm giảm sự tương tác trực tiếp giữa nhân viên và lãnh đạo, từ đó làm tăng xu hướng nghỉ việc thầm lặng.

Shuck et al. (2021) nghiên cứu trong ngành dịch vụ cho thấy mức độ nghỉ việc thầm lặng cao hơn ở những tổ chức có chính sách khen thưởng không rõ ràng và thiếu sự công nhận, từ đó khẳng định vai trò của việc xây dựng văn hóa tổ chức tích cực trong việc giảm thiểu nghỉ việc thầm lặng.

Kim & Park (2022) phân tích trên 20.000 nhân viên tại các công ty công nghệ ở châu Á cho thấy yếu tố "áp lực linh hoạt hóa" trong môi trường làm việc có ảnh hưởng tiêu cực đến mức độ gắn kết, từ đó góp phần làm nổi bật nghỉ việc thầm lặng. Họ cũng nhận định rằng sự khác biệt văn hóa giữa các quốc gia (Chủ nghĩa cá nhân và chủ nghĩa tập thể) là biến số quan trọng cần được tích hợp trong các mô hình lý thuyết.

Nghiên cứu định tính:

Các nghiên cứu định tính cung cấp cái nhìn sâu sắc về nguyên nhân và bối cảnh của nghỉ việc thầm lặng. Klotz et al. (2023) phân tích nội dung của 50.000 bài đăng sử dụng hashtag #QuietQuitting trên TikTok và LinkedIn, khẳng định nghỉ việc thầm lặng là phản ứng đối với "văn hóa làm việc không ngừng nghỉ" (hustle culture) và nhấn mạnh nhu cầu cân bằng giữa công việc và cuộc sống. Tuy nhiên, nghiên cứu này hạn chế do thiếu dữ liệu từ khu vực châu Á và các nền văn hóa tập thể. Deloitte (2022) thông qua phỏng vấn 120 nhân viên tại 20 công ty đa quốc gia đã phát hiện nghỉ việc thầm lặng phổ biến ở các bộ phận có áp lực hiệu suất cao, như IT và tài chính, mặc dù mẫu chủ yếu đến từ Bắc Mỹ và châu Âu.

Thompson & D'Angelo (2021) sử dụng phương pháp phỏng vấn sâu với 40 nhân viên từ nhiều ngành nghề tại Hoa Kỳ để khám phá các yếu tố thúc đẩy nghỉ việc thầm lặng. Kết quả cho thấy, nghỉ việc thầm lặng phần lớn được thúc đẩy bởi cảm nhận về sự mất cân bằng giữa công việc và cuộc sống, cũng như thiếu hụt hỗ trợ từ quản lý. Nghiên cứu nhấn mạnh vai trò của môi trường làm việc linh hoạt và chính sách hỗ trợ nhân viên trong việc giảm thiểu nghỉ việc thầm lặng.

Thông qua các cuộc thảo luận nhóm (focus groups) với nhân viên trong Liên minh châu Âu, nghiên cứu của Sanchez & Martin (2022) đã làm rõ rằng nghỉ việc thầm lặng xuất hiện như một chiến lược tự bảo vệ để đối phó với kỳ vọng công việc không thực tế và môi trường áp lực. Kết quả cho thấy sự khác biệt rõ rệt giữa các nền văn hóa trong cách thức nghỉ việc thầm lặng được thể hiện, đặc biệt là giữa các nền văn hóa chủ nghĩa cá nhân và tập thể.

Rodriguez et al. (2020) sử dụng phương pháp phân tích chủ đề (thematic analysis) dựa trên các cuộc phỏng vấn với nhân viên khu vực công, nhằm xác định vai trò của văn hóa tổ chức trong việc điều tiết nghỉ việc thầm lặng. Kết quả cho thấy rằng một văn hóa tổ chức hỗ trợ và cởi mở cho giao tiếp nội bộ có thể giảm thiểu xu hướng nghỉ việc thầm lặng, trong khi môi trường công việc có tính cạnh tranh cao và thiếu sự công nhận lại kích thích nghỉ việc thầm lặng.

2.3.2.Các nghiên cứu ở Việt Nam về nghỉ việc thầm lặng

Nghiên cứu định lượng:

Navigos Group (2022) khảo sát 2.000 lao động trẻ (18–35 tuổi) tại Hà Nội và TP.HCM cho thấy 27% người lao động thừa nhận có biểu hiện nghỉ việc thầm lặng, với thu nhập không tương xứng ($\chi^2 = 45.6$, $p < 0.001$) và thiếu sự công nhận

($\chi^2 = 38.2$, $p < 0.001$) được xác định là nguyên nhân chính. VietnamWorks (2023) phân tích dữ liệu từ 50.000 hồ sơ ứng viên và 500 doanh nghiệp FDI cho thấy 45% nhân viên tại các doanh nghiệp FDI có biểu hiện nghỉ việc thầm lặng, đặc biệt tập trung ở ngành sản xuất (32%) và logistics (28%). Mặc dù hai nghiên cứu này cung cấp những số liệu giá trị nhưng chúng vẫn hạn chế về phân tích theo ngành nghề chi tiết và phụ thuộc vào dữ liệu tự báo cáo từ nhà tuyển dụng.

Nghiên cứu định tính:

Nguyen et al. (2023) phỏng vấn sâu 30 nhân viên Gen Z tại Hà Nội, cho thấy nghỉ việc thầm lặng xuất phát từ xung đột giữa văn hóa doanh nghiệp truyền thống và kỳ vọng cá nhân về sự linh hoạt, sáng tạo. Le & Tran (2023) thực hiện nghiên cứu trường hợp trên 5 công ty khởi nghiệp công nghệ tại TP.HCM và phát hiện nghỉ việc thầm lặng gia tăng do áp lực mở rộng quy mô kinh doanh quá nhanh và thiếu chính sách phát triển toàn diện sức khỏe và tinh thần. Phạm et al. (2022) khảo sát tại các doanh nghiệp vừa và nhỏ nhấn mạnh vai trò của môi trường làm việc và sự thiếu hụt cơ hội phát triển trong việc kích thích nghỉ việc thầm lặng. Các nghiên cứu định tính này cung cấp cái nhìn đa chiều về nghỉ việc thầm lặng, mặc dù mỗi nghiên cứu vẫn gặp hạn chế về mẫu và phạm vi khảo sát.

3. Phân tích khoảng trống nghiên cứu (Gap Analysis)

Thiếu tích hợp yếu tố tâm lý cá nhân:

Hầu hết các nghiên cứu định lượng toàn cầu (Gallup, 2022; McKinsey, 2023) chủ yếu tập trung vào các yếu tố tổ chức như lương và phong cách lãnh đạo, mà bỏ qua các cơ chế tâm lý tự chủ như trí tuệ cảm xúc, động lực nội tại hay khả năng tự điều chỉnh căng thẳng. Ở Việt Nam, các nghiên cứu (Navigos, 2022; Nguyen et al., 2023) chủ yếu chỉ mô tả hành vi nghỉ việc thầm lặng mà chưa đo lường được tác động của kiểm soát cảm xúc hoặc kỳ vọng nghề nghiệp cá nhân. Sự thiếu hụt này phần lớn do thiếu các công cụ đo lường chuẩn hóa cho các biến tâm lý trong bối cảnh đa văn hóa, cùng với định hướng nghiên cứu thiên về giải pháp quản trị hơn là phân tích cơ chế nội tại.

Bỏ qua yếu tố văn hóa tổ chức đa quốc gia:

Nhiều nghiên cứu quốc tế, ví dụ như của Klotz et al. (2023), giải thích nghỉ việc thầm lặng qua lăng kính văn hóa cá nhân (individualism) với trọng tâm là cân bằng công việc – cuộc sống, nhưng không thể áp dụng được cho bối cảnh văn hóa tập thể (collectivism) phổ biến ở các quốc gia Á Đông. Tại Việt Nam, hiện chưa có nghiên cứu nào phân tích xung đột văn hóa giữa doanh nghiệp đa quốc gia (có môi trường làm việc linh hoạt) và doanh nghiệp truyền thống (có thứ bậc cứng nhắc). Sự thiếu hụt này phần nào do chưa tích hợp khung lý thuyết về khác biệt văn hóa, chẳng hạn như mô hình của Hofstede (2011), cũng như dữ liệu đa quốc gia chưa đại diện cho các nền văn hóa phi phương Tây.

Hạn chế về phương pháp luận:

Đa số các nghiên cứu định lượng hiện nay dựa vào dữ liệu tự báo cáo, dễ bị ảnh hưởng bởi thiên kiến xã hội (social desirability bias), đặc biệt ở các quốc gia Á Đông nơi người lao động thường ngại bày tỏ thái độ tiêu cực (Gallup, 2022; McKinsey, 2023). Thêm vào đó, còn thiếu các nghiên cứu dài hạn để đánh giá diễn tiến nghỉ việc thầm lặng theo thời gian cũng như hiệu quả của các can thiệp quản trị nhân sự.

Chưa cập nhật bối cảnh hậu đại dịch và tác động của công nghệ:

Các nghiên cứu trước năm 2020 thường không đề cập đến tác động của hình thức làm việc kết hợp (hybrid) và tự động hóa – hai yếu tố làm gia tăng cảm giác cô lập và bất ổn nghề nghiệp (WHO, 2021; OECD, 2020). Tại Việt Nam, hiện chưa có nghiên cứu nào phân tích nghỉ việc thầm lặng trong ngành công nghệ, một lĩnh vực chịu ảnh hưởng mạnh của trí tuệ nhân tạo và áp lực đổi mới.

Những khoảng trống này cho thấy sự cần thiết của việc phát triển một mô hình lý thuyết tích hợp – Mô hình động lực phản chiếu (reflective motivation model - RMM).

4. PHÁT TRIỂN MÔ HÌNH LÝ THUYẾT MỚI (THEORETICAL MODEL DEVELOPMENT)

4.1. Nền tảng lý thuyết

Mô hình động lực phản chiếu (reflective motivation model - RMM) được xây dựng dựa trên sự tích hợp của ba trường phái lý thuyết:

Lý thuyết tự quyết (Self-Determination Theory – SDT) (Deci & Ryan, 2000): Nhấn mạnh vai trò của động lực nội tại và nhu cầu tâm lý cơ bản.

Mô hình nguồn lực – áp lực Công việc (JD-R) (Bakker & Demerouti, 2007): Phân tích tương tác giữa áp lực và nguồn lực trong môi trường làm việc.

Lý thuyết hành vi kế hoạch (Theory of Planned Behavior – TPB) (Ajzen, 1991): Giải thích hành vi thông qua nhận thức, thái độ và chuẩn mực chủ quan.

RMM mở rộng các lý thuyết này bằng cách tích hợp yếu tố đa cấp độ (cá nhân, tổ chức, toàn cầu) và bối cảnh văn hóa, phù hợp với hiện tượng nghỉ việc thầm lặng trong môi trường lao động hiện đại.

4.2. Cấu trúc Mô hình RMM

Mô hình RMM được chia thành ba cấp độ rõ ràng – cá nhân, tổ chức và yếu tố toàn cầu – với mỗi cấp độ có các yếu tố và cơ chế tác động riêng biệt. Cụ thể:

Cấp độ cá nhân: Nhấn mạnh năng lực nội tại như trí tuệ cảm xúc và động lực nội tại, các yếu tố đã được chứng minh là quan trọng trong việc quản lý căng thẳng và duy trì cam kết làm việc. Cụ thể:

Trí tuệ cảm xúc (EQ): Là năng lực nội tại của cá nhân, liên quan đến khả năng nhận diện, quản lý và điều chỉnh cảm xúc cũng như ứng phó với căng thẳng trong quá trình làm việc (Goleman, 1995). Nhân viên có EQ cao dễ dàng thích nghi với biến động tổ chức (chuyển đổi số, thay đổi chính sách) – yếu tố then chốt trong bối cảnh hậu đại dịch (Côté, 2014). EQ thúc đẩy giao tiếp hiệu quả với đồng nghiệp và lãnh đạo, giảm xung đột vai trò (Lopes et al., 2006).

Động lực nội tại: Mức độ mà công việc đáp ứng các nhu cầu tự chủ, năng lực và kết nối của cá nhân (Deci & Ryan, 2000). Nhân viên có động lực nội tại ít bị ảnh hưởng bởi yếu tố như lương thưởng không công bằng (Kuvaas et al., 2017). Động lực nội tại liên quan đến việc chủ động đề xuất ý tưởng mới, ngăn chặn hành vi "làm tối thiểu" (Amabile, 1996).

Cơ chế: Sự tương tác giữa EQ và động lực nội tại đóng vai trò điều tiết mối quan hệ giữa áp lực công việc và nghỉ việc thầm lặng, giúp cá nhân duy trì sự cam kết khi đối mặt với căng thẳng.

Cấp độ tổ chức: Tập trung vào văn hóa phản hồi và phong cách lãnh đạo, cung cấp cơ sở cho môi trường làm việc hỗ trợ và giảm thiểu nghỉ việc thầm lặng. Cụ thể:

Văn hóa phản hồi: Mức độ khuyến khích giao tiếp đa chiều và sự công nhận nội bộ trong tổ chức (Edmondson, 1999). Phản hồi định kỳ và mang tính xây dựng thúc đẩy cảm giác thuộc về, giảm xu hướng rút lui tâm lý (Kluger & DeNisi, 1996). Phản hồi giúp tổ chức phát hiện sớm dấu hiệu kiệt sức hoặc bất mãn để can thiệp (Ashford et al., 2016).

Lãnh đạo đa chiều: Khả năng lãnh đạo cân bằng giữa việc đạt hiệu suất cao và phát triển toàn diện về sức khỏe cũng như tinh thần của nhân viên (Uhl-Bien & Arena, 2018). Khả năng truyền cảm hứng và gắn kết nhân viên với tầm nhìn chung giảm xu hướng nghỉ việc thầm lặng thông qua tăng động lực nội tại (Bass & Riggio, 2006). Tập trung vào phát triển nhân viên và đáp ứng nhu cầu cá nhân giúp giảm kiệt sức cảm xúc (Liden et al., 2014).

Cơ chế: Văn hóa phản hồi và lãnh đạo đa chiều giúp giảm nhận thức về sự bất công và tạo ra môi trường làm việc hỗ trợ, từ đó giảm thiểu xu hướng nghỉ việc thầm lặng.

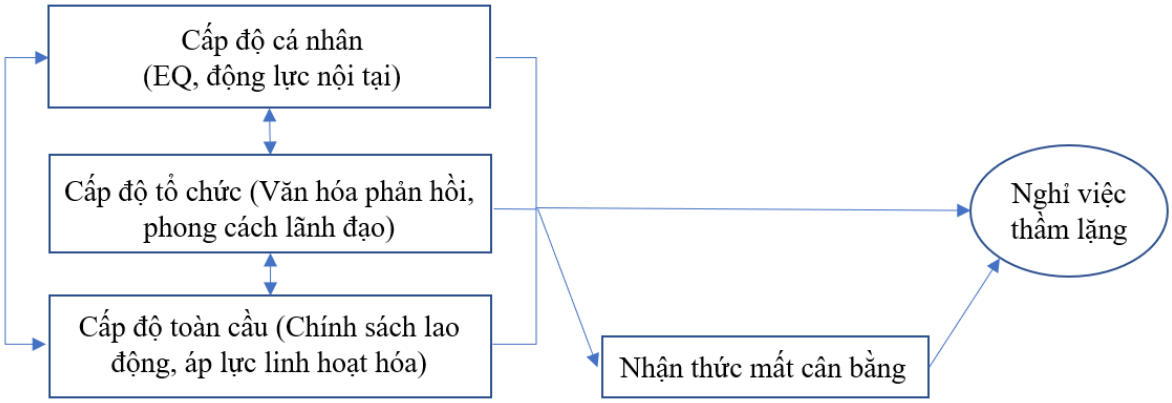
Cấp độ toàn cầu: Phản ánh tác động của các yếu tố vĩ mô như chênh lệch chính sách lao động và áp lực linh hoạt hóa trong bối cảnh biến động kinh tế – xã hội. Cụ thể:

Chênh lệch chính sách lao động: Sự khác biệt trong các quy định về làm việc linh hoạt giữa các quốc gia không chỉ phản ánh mức độ bảo vệ người lao động mà còn định hình điều kiện làm việc. Khi các quốc gia có chính sách lao động khác nhau, các tổ chức phải đối mặt với áp lực cạnh tranh quốc tế, buộc phải nâng cao hiệu suất làm việc để duy trì vị thế. Sự chênh lệch này có thể tạo ra sự không đồng nhất trong việc áp dụng các chiến lược quản trị nhân sự, dẫn đến sự mất cân bằng trong cam kết của nhân viên (Tổ chức Lao động Quốc tế [ILO], 2021). Chênh lệch trong quy định nghỉ phép, an toàn lao động, hoặc quyền lợi gia đình làm gia tăng căng thẳng liên văn hóa, đặc biệt ở nhân viên phải làm việc xuyên biên giới (Hofstede, 2011).

Áp lực linh hoạt hóa trong sự biến động kinh tế - xã hội: Xu hướng làm việc kết hợp giữa làm việc tại văn phòng với làm việc từ xa (hybrid/remote) đòi hỏi nhân viên cân bằng giữa công việc và đời sống cá nhân trong điều kiện thiếu ranh giới rõ ràng (World Economic Forum, 2023). Tự động hóa và trí tuệ nhân tạo (AI) khiến nhân viên phải liên tục học kỹ năng mới, dẫn đến kiệt sức tri thức (Brynjolfsson & McAfee, 2014).

Cơ chế: Các yếu tố vĩ mô này tạo ra áp lực gián tiếp bằng cách gia tăng kiệt sức và làm giảm động lực nội tại của nhân viên, từ đó góp phần vào nghỉ việc thầm lặng.

Hình 1. Mô hình Động lực phản chiếu (RMM)



Ngoài các yếu tố đã được đề cập trong mô hình động lực phản chiếu (RMM), hiện tượng nghỉ việc thầm lặng còn chịu ảnh hưởng bởi nhiều yếu tố đa dạng khác như:

Đại dịch COVID-19 đã làm thay đổi đáng kể nhận thức về sức khỏe tâm thần tại nơi làm việc (WHO, 2021). Tình trạng kiệt sức và các vấn đề sức khỏe tâm thần liên quan đến công việc đã trở thành yếu tố quan trọng dẫn đến nghỉ việc thầm lặng (Deloitte, 2022).

Sự khác biệt về giá trị và kỳ vọng giữa các thế hệ trong lực lượng lao động đã tạo ra những thách thức mới trong quản trị nhân sự (McKinsey, 2023). Các nghiên cứu chỉ ra rằng thế hệ trẻ thường có cách tiếp cận khác biệt về mối quan hệ giữa công việc và cuộc sống cá nhân (Gallup, 2022).

Đặc điểm riêng của từng ngành nghề có ảnh hưởng quan trọng đến tỷ lệ nghỉ việc thầm lặng (Maslach & Leiter, 2016). Các ngành nghề có tính chất công việc đặc thù thường phải đối mặt với những thách thức riêng trong việc duy trì sự gắn bó của nhân viên (VietnamWorks, 2023).

Cảm giác không công bằng trong tổ chức: Khi nhân viên cảm nhận sự bất công trong hệ thống thưởng phạt, giao tiếp và các chính sách nhân sự, họ có xu hướng rút lui và chỉ thực hiện công việc tối thiểu (Kuvaas et al., 2017).

Sự bất ổn nghề nghiệp: Cảm giác không an toàn về công việc (job insecurity) có thể làm tăng mức độ nghỉ việc thầm lặng vì nhân viên lo lắng về tương lai nghề nghiệp của mình (De Witte, 1999).

Thiếu cơ hội phát triển nghề nghiệp: Sự hạn chế trong cơ hội thăng tiến và phát triển kỹ năng cũng góp phần làm giảm động lực nội tại và thúc đẩy hành vi NVTL (Maslach & Leiter, 2016).

4.3. Giả thuyết trung tâm

Giả thuyết điều tiết cá nhân (H1): Trí tuệ cảm xúc đóng vai trò điều tiết mối quan hệ giữa áp lực công việc và nghỉ việc thầm lặng, với giả định rằng khi EQ của nhân viên cao, mối liên hệ giữa áp lực công việc và nghỉ việc thầm lặng sẽ được làm yếu, dẫn đến mức độ nghỉ việc thầm lặng thấp hơn.

Giả thuyết văn hóa tổ chức (H2): Văn hóa phản hồi mạnh mẽ trong tổ chức giúp giảm nhận thức bất công của nhân viên, từ đó làm giảm hiện tượng nghỉ việc thầm lặng. Cụ thể, một môi trường làm việc có văn hóa phản hồi hiệu quả sẽ liên quan đến nghỉ việc thầm lặng thấp.

Giả thuyết toàn cầu (H3): Sự chênh lệch trong chính sách lao động giữa các quốc gia điều chỉnh tác động của kiệt sức lên nghỉ việc thầm lặng, với giả định rằng mức độ chênh lệch cao sẽ làm tăng nghỉ việc thầm lặng thông qua việc gia tăng áp lực và giảm động lực nội tại.

4.4. Cơ chế tương tác đa cấp độ

Mô hình động lực phản chiếu (RMM) đề xuất rằng hiện tượng nghỉ việc thầm lặng là kết quả của sự tương tác động lực giữa ba cấp độ: cá nhân, tổ chức và yếu tố toàn cầu. Cụ thể:

Cá nhân ↔ Tổ chức:

Động lực nội tại của cá nhân, được thể hiện qua trí tuệ cảm xúc và mức độ tự chủ, sẽ bị suy giảm khi tổ chức thiếu

một văn hóa phản hồi tích cực. Khi môi trường tổ chức không khuyến khích giao tiếp hai chiều và không công nhận đóng góp của nhân viên, sự cam kết và động lực nội tại của cá nhân sẽ giảm sút, dẫn đến nghỉ việc thầm lặng.

Tổ chức ↔ Toàn cầu:

Áp lực cạnh tranh toàn cầu buộc các tổ chức phải nâng cao hiệu suất làm việc nhằm duy trì vị thế và khả năng cạnh tranh. Tuy nhiên, việc này thường đi kèm với tăng cường áp lực công việc, dẫn đến kiệt sức nghề nghiệp và sau đó là nghỉ việc thầm lặng. Sự căng thẳng từ môi trường kinh tế – xã hội toàn cầu tác động gián tiếp thông qua yêu cầu về hiệu suất và đổi mới liên tục.

Cá nhân ↔ Toàn cầu:

Cá nhân có mức độ trí tuệ cảm xúc thấp dễ bị ảnh hưởng bởi các áp lực vĩ mô, chẳng hạn như tự động hóa và biến động công nghệ. Khi không có khả năng tự điều chỉnh cảm xúc hiệu quả, nhân viên sẽ gặp khó khăn trong việc thích nghi với những thay đổi nhanh chóng trong môi trường làm việc toàn cầu, từ đó làm tăng khả năng nghỉ việc thầm lặng.

Sự tương tác chặt chẽ giữa các cấp độ này tạo nên một hệ thống phức hợp, trong đó nghỉ việc thầm lặng không chỉ là kết quả của một yếu tố riêng lẻ mà là sản phẩm của mối quan hệ động lực giữa các yếu tố cá nhân, tổ chức và toàn cầu. Mô hình RMM do đó cung cấp một khung lý thuyết toàn diện, định hướng cho các nghiên cứu thực nghiệm tiếp theo và đề xuất các giải pháp quản trị nhân sự thích ứng trong môi trường toàn cầu đa văn hóa.

4.5. So sánh với mô hình hiện có

Sự khác biệt chính giữa mô hình JD-R và mô hình động lực phản chiếu (RMM) có thể được tóm tắt như sau:

Bảng 1. So sánh giữa mô hình JD-R và mô hình động lực phản chiếu (RMM)

Yếu tố	Mô hình JD-R	Mô hình RMM
Phạm vi	Tập trung chủ yếu vào cấp độ vi mô (cá nhân và tổ chức).	Tích hợp đa cấp độ, bao gồm cá nhân, tổ chức và yếu tố toàn cầu.
Yếu tố văn hóa	Không xem xét hoặc xem nhẹ khác biệt văn hóa.	Tích hợp sự khác biệt văn hóa theo khung của Hofstede (2011), phản ánh tác động của môi trường văn hóa đối với động lực và nghỉ việc thầm lặng.
Cơ chế động lực	Xây dựng theo hướng động lực đơn hướng, tập trung vào mối quan hệ giữa yêu cầu và nguồn lực.	Xây dựng theo cơ chế động lực phản chiếu, nhấn mạnh tương tác đa chiều giữa các yếu tố cá nhân, tổ chức và yếu tố toàn cầu.

Mô hình RMM được đề xuất nhằm khắc phục hạn chế của các mô hình truyền thống bằng cách mở rộng phạm vi phân tích và tích hợp các biến số vĩ mô và văn hóa, từ đó cung cấp một khung lý thuyết toàn diện hơn để giải thích hiện tượng nghỉ việc thầm lặng trong bối cảnh toàn cầu đa văn hóa.

5. ĐÓNG GÓP THỰC TIỄN

5.1. Ý nghĩa của mô hình lý thuyết mới

Mô hình RMM mang lại một khung lý thuyết tích hợp, giúp các doanh nghiệp và các nhà quản lý nhân sự có cái nhìn toàn diện hơn về hiện tượng nghỉ việc thầm lặng. Cụ thể:

Dự đoán toàn diện nghỉ việc thầm lặng: RMM cho phép nhận diện và phân tích nghỉ việc thầm lặng dựa trên sự tương tác giữa các yếu tố cá nhân, yếu tố tổ chức, yếu tố toàn cầu. Qua đó, doanh nghiệp có thể chẩn đoán chính xác các điểm yếu trong môi trường làm việc và nguyên nhân gốc rễ của nghỉ việc thầm lặng.

Định hướng can thiệp cụ thể: Với khung phân tích đa cấp độ, RMM giúp các nhà quản lý xác định các điểm can thiệp cụ thể như cải thiện đào tạo và phát triển trí tuệ cảm xúc, xây dựng văn hóa làm việc hỗ trợ thông qua phản hồi tích cực và thay đổi phong cách lãnh đạo, cũng như điều chỉnh các chính sách lao động để phù hợp với bối cảnh toàn cầu hóa. Điều này góp phần giảm nghỉ việc thầm lặng và tăng cường hiệu suất làm việc.

Hỗ trợ chiến lược quản trị nhân sự: Mô hình không chỉ là công cụ dự đoán mà còn là cơ sở để xây dựng các chiến lược quản trị nhân sự dài hạn. Nó giúp doanh nghiệp dự báo xu hướng và thiết kế các chính sách linh hoạt, phù hợp với sự phát triển của lực lượng lao động toàn cầu, đặc biệt là sự ảnh hưởng của các thế hệ trẻ như Gen Z.

5.2 Hạn chế của nghiên cứu này và định hướng các nghiên cứu tiếp theo

5.2.1. Hạn chế của nghiên cứu

Mặc dù nghiên cứu này đã đóng góp vào việc xây dựng khung lý thuyết tích hợp thông qua mô hình động lực phản chiếu (RMM) nhằm giải thích hiện tượng nghỉ việc thầm lặng, vẫn tồn tại một số hạn chế cần được lưu ý để làm nền tảng cho các nghiên cứu tiếp theo:

Phạm vi dữ liệu: Nghiên cứu chủ yếu dựa trên tổng hợp các nghiên cứu trước đó. Việc mở rộng mẫu nghiên cứu qua các nghiên cứu thực nghiệm đa văn hóa sẽ giúp kiểm chứng tính khái quát của mô hình.

Công cụ đo lường: Các thang đo hiện hành cho các biến số như trí tuệ cảm xúc và động lực nội tại cần được điều chỉnh và chuẩn hóa thêm để phù hợp với bối cảnh đa văn hóa và đặc thù tổ chức.

Bối cảnh thay đổi: Mô hình cần được cập nhật thêm và đầy đủ hơn để phản ánh các biến động kinh tế – xã hội và sự phát triển nhanh chóng của công nghệ hiện đại.

Những hạn chế này mở ra hướng nghiên cứu tiếp theo nhằm kiểm chứng và cải tiến mô hình, đồng thời phát triển các giải pháp quản trị nhân sự hiệu quả trong môi trường toàn cầu đa văn hóa.

5.2.2. Định hướng các nghiên cứu tiếp theo

Kiểm định thực nghiệm: Đo lường tác động của EQ và văn hóa phản hồi lên nghỉ việc thầm lặng bằng phương pháp SEM (Mô hình phương trình cấu trúc).

Nghiên cứu so sánh đa văn hóa: Áp dụng RMM tại các quốc gia individualism (Mỹ) và collectivism (Nhật Bản, Việt Nam).

Phát triển công cụ đo lường: Xây dựng thang đo đa cấp độ cho nghỉ việc thầm lặng, tích hợp chỉ số EQ và chênh lệch chính sách.

6. KẾT LUẬN

Nghiên cứu này đã tổng hợp và phân tích các lý thuyết nền tảng về động lực làm việc và gắn kết nhân viên, qua đó làm sáng tỏ những hạn chế trong việc giải thích hiện tượng nghỉ việc thầm lặng của các mô hình truyền thống. Từ đó, nghiên cứu đề xuất mô hình động lực phản chiếu (RMM) – một khung lý thuyết tích hợp đồng thời ba cấp độ: cá nhân, tổ chức và yếu tố toàn cầu.

Mô hình RMM nhấn mạnh vai trò của các yếu tố tâm lý cá nhân như trí tuệ cảm xúc và động lực nội tại trong việc điều tiết mối quan hệ giữa áp lực công việc và nghỉ việc thầm lặng; đồng thời, chỉ ra rằng một môi trường tổ chức với văn hóa phản hồi và phong cách lãnh đạo linh hoạt có thể giảm thiểu nghỉ việc thầm lặng. Bên cạnh đó, yếu tố toàn cầu như chênh lệch chính sách lao động và áp lực linh hoạt hóa trong bối cảnh biến động kinh tế – xã hội cũng được tích hợp, nhằm phản ánh tác động gián tiếp lên động lực và hiệu suất làm việc trong bối cảnh toàn cầu hóa.

Những đóng góp của nghiên cứu không chỉ mở rộng phạm vi lý thuyết nghỉ việc thầm lặng trong môi trường toàn cầu đa văn hóa mà còn định hướng các nghiên cứu thực nghiệm tiếp theo, cũng như đề xuất các giải pháp quản trị nhân sự hiệu quả nhằm nâng cao sự gắn kết và hiệu suất làm việc của nhân viên.

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VAI TRÒ KẾT NỐI GIỮA TRI THỨC VÀ PHÁT TRIỂN BỀN VỮNG CỦA GIÁO DỤC ĐẠI HỌC

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TÓM TẮT

Nghiên cứu này sử dụng phương pháp tổng hợp lý thuyết, phân tích thực tiễn từ Đại học Toronto (UofT) và Viện Công nghệ Liên bang Thụy Sĩ Zurich (ETH Zurich), so sánh với các mục tiêu phát triển bền vững (PTBV) (SDGs) để đánh giá cách thức mà giáo dục đại học (GDĐH) có thể định hình hành vi, nhận thức để đạt được các mục tiêu PTBV. Kết quả chính cho thấy, UofT đã dẫn đầu các trường đại học trên thế giới nhờ tích hợp nội dung PTBV vào giảng dạy, quản trị, giảm được lượng khí thải, trong khi ETH Zurich nổi bật với các phát triển công nghệ năng lượng tái tạo. Dựa trên bài học kinh nghiệm từ UofT và ETH Zurich, nghiên cứu đề xuất địa phương hóa chương trình, áp dụng phương thức hợp tác ba bên với doanh nghiệp, ứng dụng công nghệ mới và xây dựng khuôn viên xanh để biến GDĐH thành cầu nối hiệu quả nhằm tiến đến một tương lai bền vững hơn.

Từ khóa: Đại học Toronto, giáo dục đại học, kết nối, phát triển bền vững, Viện Công nghệ Liên bang Thụy Sĩ Zurich.

1. ĐẶT VẤN ĐỀ

Sự phát triển vượt bậc về công nghệ, khoa học và kinh tế trên toàn cầu trong những thập kỷ qua đã mang lại những thành tựu đáng kể, từ việc chất lượng cuộc sống được cải thiện với mức tăng trưởng GDP toàn cầu đạt trung bình 3% mỗi năm (World Bank, 2022), đến các đột phá vượt trội trong y học và trí tuệ nhân tạo. Tuy nhiên, mặt trái của tiến trình này cũng đem đến những thách thức nghiêm trọng về biến đổi khí hậu do nhiệt độ tăng 1,1°C (IPCC, 2023), nhiều loài động, thực vật đối mặt nguy cơ tuyệt chủng và còn tăng nguy cơ lây nhiễm các mầm bệnh từ động vật sang người (UNEP, 2021), gần 700 triệu người trên toàn cầu vẫn sống ở mức dưới 2,15 đô la/ngày (World Bank, 2024) và bất bình đẳng gia tăng. Trước bối cảnh này, PTBV được định hình qua 17 SDGs trong Chương trình Nghị sự 2030 của Liên Hợp Quốc, đã trở thành giải pháp quan trọng để ứng phó, hướng tới một thế giới cân bằng giữa tăng trưởng kinh tế, công bằng xã hội và bảo vệ môi trường.

Tại Việt Nam, Chiến lược PTBV giai đoạn 2011-2020 đã sớm được Chính phủ thông qua với mục tiêu "tăng trưởng bền vững gắn với hiệu quả kinh tế, tiến bộ và công bằng xã hội, đồng thời bảo vệ tài nguyên và môi trường". Chiến lược này được triển khai bởi Nghị quyết 136/NQ-CP (2020), xác định 17 SDGs phù hợp với điều kiện quốc gia và Quyết định 841/QĐ-TTg (2023), đưa ra lộ trình thực hiện đến năm 2030. Trong lĩnh vực giáo dục, Nghị quyết 29/NQ-TW (2013) về đổi mới căn bản và toàn diện giáo dục đã tạo tiền đề để định hướng GDĐH theo hướng PTBV, nhấn mạnh vai trò đào tạo nguồn nhân lực chất lượng cao, có khả năng thích ứng với các yêu cầu phát triển xanh và bền vững. Tuy nhiên, việc tích hợp các yếu tố của giáo dục vì sự PTBV trong các chương trình đào tạo giáo viên hiện nay còn hạn chế. Trong số 429 chương trình đào tạo được phân tích tại Trường Đại học Sư phạm Hà Nội, mức độ tích hợp PTBV chưa được đánh giá cao (Nguyễn, A. N., & cộng sự, 2023). Ngoài ra, khảo sát của Trường Đại học Kinh tế TP.HCM (UEH) cho thấy 42% sinh viên chưa hiểu chính xác về khái niệm phân loại rác và 32% không thực hiện việc phân loại rác (UEH, 2023). Những thực tế này phản ánh sự chậm trễ trong việc tiếp cận và triển khai phương thức giáo dục xanh và bền vững, tạo nên những khó khăn trong việc ứng dụng các công nghệ hiện đại vào giảng dạy và quản trị, những yếu tố mà các trường đại học hàng đầu thế giới đã thực hiện thành công. Tuy nhiên, Việt Nam với đặc thù như có nguồn năng lượng tái tạo dồi dào (bao gồm điện gió và điện mặt trời), đạt cường độ bức xạ trung bình 4-5 kWh/m²/ngày, đạt 21.664 GW, chiếm 27% trong tổng công suất nguồn điện toàn hệ thống (EVN, 2023) và có hệ sinh thái phong phú của Đồng bằng sông Cửu Long - vùng kinh tế nông nghiệp quan trọng đóng góp 56% lượng lúa gạo cả nước (MARD, 2023), đang đối mặt với vấn đề xâm nhập mặn nghiêm trọng, ảnh hưởng đến diện tích đất nông nghiệp. Điều này không chỉ là thách thức mà còn là nguồn tài nguyên

sống động để GDĐH khai thác, biến thành các phòng thí nghiệm thực tế cho nghiên cứu và giảng dạy về PTBV.

Nghiên cứu này không chỉ đánh giá lại vai trò của GDĐH trong việc thúc đẩy PTBV mà còn đề xuất các giải pháp cụ thể nhằm giúp Việt Nam đạt được các mục tiêu PTBV đến năm 2030, đồng thời đóng góp vào nỗ lực toàn cầu trong việc xây dựng một tương lai bền vững hơn thông qua học hỏi từ các mô hình tiên tiến như UofT và ETH Zurich.

2. Khung lý thuyết

2.1. Lý thuyết về phát triển bền vững

Khái niệm PTBV xuất hiện trong báo cáo Our Common Future của Ủy ban Thế giới về Môi trường và Phát triển (WCED), là quá trình phát triển "đáp ứng nhu cầu của hiện tại mà không làm tổn hại đến khả năng đáp ứng nhu cầu của các thế hệ tương lai" (Brundtland, 1987). Theo UNESCO (2021), PTBV không chỉ là một mục tiêu mà còn là một "khung tư duy" nhằm định hướng các chính sách và hành động để đảm bảo sự phát triển hài hòa, trong đó kinh tế tăng trưởng không gây tổn hại đến môi trường và chế độ phúc lợi cũng như sự công bằng được nâng cao hơn. Trên toàn cầu, PTBV được cụ thể hóa qua Chương trình Nghị sự 2030 của Liên Hợp Quốc, với 17 SDGs được thông qua năm 2015 (United Nations, 2015). PTBV nhấn mạnh sự cân bằng giữa ba trụ cột chính: kinh tế, xã hội và môi trường. Trong đó, trụ cột kinh tế tập trung vào việc duy trì tăng trưởng ổn định mà không làm cạn kiệt nguồn tài nguyên; trụ cột xã hội tập trung vào sự công bằng và nâng cao chất lượng sống, trong khi trụ cột môi trường hướng đến bảo vệ hệ sinh thái, giảm lượng khí thải và duy trì sự đa dạng của môi trường sinh học tự nhiên. Vì vậy, PTBV đòi hỏi một cách tiếp cận tích hợp, trong đó các yếu tố này không chỉ cùng tồn tại mà còn phải hỗ trợ lẫn nhau để đạt được sự bền vững lâu dài.

Tại Việt Nam, PTBV được diễn giải là "phát triển toàn diện, kết hợp hiệu quả kinh tế, công bằng xã hội và bảo vệ môi trường" (Tạp chí Giáo dục, 2023). Các quốc gia hiện nay đang thực hiện PTBV theo định hướng Nâu, tập trung giải quyết các vấn đề cấp bách như ô nhiễm, nghèo đói và định hướng Xanh, khai thác tiềm năng phát triển bền vững trong tương lai. Đối với định hướng Nâu, Việt Nam đang đối mặt với tình trạng ô nhiễm nghiêm trọng, đặc biệt là ô nhiễm các dòng sông như sông Bắc Hưng Hải và Sông Nhuệ - Đáy (Pháp luật, 2024). Đồng thời, tuy tỷ lệ nghèo giảm từ 36,5% năm 2016 xuống còn 23,7% năm 2022, nhưng bất bình đẳng vẫn tồn tại (GSO, 2023). Đối với định hướng Xanh, Việt Nam có tiềm năng lớn về năng lượng tái tạo, với công suất điện mặt trời chiếm tỷ lệ đáng kể trong tổng sản lượng điện quốc gia nhờ cường độ bức xạ cao (EVN, 2023). Điều này cho thấy Việt Nam có thể vừa giải quyết thách thức trước mắt vừa xây dựng nền tảng cho phát triển xanh trong tương lai.

Đối với GDĐH, PTBV không chỉ là một chiến lược mà còn là một tư duy hành động, chuyển hóa lý thuyết thành các giải pháp phù hợp với các thách thức hiện tại (Sterling, 2020). PTBV trong GDĐH vì vậy cần được hiểu như một hệ thống mở, trong đó các trường đại học không chỉ phản ánh các mục tiêu kinh tế - xã hội - môi trường mà còn đóng vai trò cầu nối, khai thác tiềm năng địa phương để đào tạo nhân lực, nghiên cứu giải pháp và lan tỏa tư duy bền vững ra cộng đồng. Thực tế hiện nay các trường đại học trên thế giới đã thực hiện thành công các mục tiêu PTBV thông qua việc áp dụng các mô hình quản lý gắn liền với 17 SDGs của Liên Hiệp Quốc, điển hình như UofT đã triển khai chương trình “Tri-campus Sustainability Framework” với các mục tiêu chính là giảm thải carbon, nâng cao sự bình đẳng trong xã hội và chuyển giao tri thức thông qua các dự án kết nối cộng đồng. Mô hình của UofT nhấn mạnh sự tham gia của các bên liên quan trong việc cùng nhau đề ra các giải pháp bền vững và hoàn toàn phù hợp lý thuyết “co-creation (tạo dựng chung) của Trencher etal. (2017). Bên cạnh đó, ETH triển khai mô hình kết hợp nghiên cứu ứng dụng thực tiễn. Trường tập trung vào việc giảm tác động môi trường, giáo dục chuyển đổi và quản trị minh bạch. Mô hình này tương thích với lý thuyết “transdisciplinary research” (nghiên cứu liên ngành), trong đó các giải pháp được triển khai xuất phát từ sự hợp tác giữa khoa học, công nghiệp và xã hội. Ngoài ra, ở Châu Á, Đại học Quốc gia Singaphore – NUS cam kết thực hiện “NUS Sustainability Framework”, tập trung vào giáo dục, nghiên cứu và vận hành bền vững, trong đó các giải pháp về PTBV một mặt được điều chỉnh để phù hợp với bối cảnh đô thị hóa nhanh và áp lực môi trường của Đông Nam Á mặt khác kết hợp với các tiêu chuẩn quốc tế. Mô hình của NUS đã dựa trên lý thuyết “context – based sustainability” (bền vững dựa trên bối cảnh). Như vậy, dựa trên mô hình PTBV của các trường đại học trên thế giới, có thể xây dựng khung lý thuyết PTBV kết hợp gồm: Giáo dục cộng động từ UofT, nghiên cứu ứng dụng công nghệ từ ETH và PTBV dựa trên bối cảnh từ NUS. Việc kết hợp này tạo nên mô hình GDDH toàn diện, vừa mang tính địa phương hóa vừa đáp ứng các tiêu chuẩn toàn cầu hiện nay.

2.2. Vai trò của giáo dục đại học trong phát triển bền vững

GDĐH đóng vai trò trung tâm để thúc đẩy PTBV thông qua bốn yếu tố cốt lõi sau:

Thứ nhất, bằng cách lồng ghép và tích hợp hài hòa các nội dung PTBV vào chương trình giảng dạy, GDĐH giúp nâng cao nhận thức và tư duy bền vững cho người học. Sterling khẳng định rằng "tư duy bền vững không chỉ là lý thuyết mà là công cụ định hướng hành động, kết nối chặt chẽ ba trụ cột kinh tế, xã hội và môi trường" (Sterling, 2020).

Thứ hai, thông qua các sáng kiến thực tế trong khuôn viên trường, GDĐH xây dựng văn hóa và lối sống bền vững. Barth nhấn mạnh rằng "văn hóa bền vững trong trường đại học có thể tạo ảnh hưởng sâu rộng, thay đổi hành vi cá nhân và lan tỏa giá trị ra xã hội" (Barth et al., 2019).

Thứ ba, với việc triển khai và thúc đẩy nghiên cứu liên ngành, kết quả nghiên cứu của GDĐH góp phần giải quyết các vấn đề địa phương. Tuy nhiên, nguồn lực nghiên cứu tại Việt Nam còn hạn chế, đòi hỏi sự đầu tư lớn hơn để phát huy vai trò này.

Cuối cùng, bằng cách tạo cơ hội cho phụ nữ tham gia vào các lĩnh vực khoa học, kỹ thuật, công nghệ tiên tiến và toán học (STEM), GDĐH thúc đẩy bình đẳng giới và tiến bộ xã hội, phù hợp với SDG5. Tại Việt Nam, phụ nữ chỉ chiếm 29% lực lượng lao động STEM và 52% lực lượng lao động có trình độ đại học (Báo điện tử Đại biểu Nhân dân, 2023).

Như vậy, GDĐH không chỉ là nơi cung cấp tri thức lý thuyết nền tảng mà còn là động lực chuyển hóa tư duy PTBV thành hành động cụ thể, từ nâng cao nhận thức, xây dựng văn hóa xanh, nghiên cứu giải pháp địa phương, đến thúc đẩy bình đẳng, tiến bộ xã hội, đặt nền tảng cho các chiến lược thực tiễn trong bối cảnh Việt Nam.

3. KẾT QUẢ VÀ THẢO LUẬN

Bảng xếp hạng QS World University Rankings: Sustainability được Quacquarelli Symonds (QS) triển khai từ năm 2022, đánh giá các cơ sở GDĐH dựa trên ba yếu tố chính: tác động môi trường (45%), tác động xã hội (45%) và quản trị (10%) (QS World University Rankings, 2025). Trong bảng xếp hạng QS Sustainability 2025, với sự tham gia của gần 1.800 trường từ hơn 100 quốc gia, UofT đã vượt qua các đối thủ để dẫn đầu, trong khi ETH Zurich xếp thứ 2. Phần này phân tích thành tựu của UofT và ETH Zurich, rút ra bài học cho GDĐH Việt Nam dựa trên dữ liệu cụ thể và so sánh chi tiết.

3.1. Thành tựu của UofT

Trong QS Sustainability Rankings 2025 UofT đạt điểm tổng thể 100%, trở thành hình mẫu cho các cơ sở GDĐH toàn cầu. Thành tựu này được minh họa qua kết quả chi tiết trong bảng 1 dưới đây:

Bảng 1. Kết quả xếp hạng về tính bền vững của UofT năm 2025

Indicator (Chỉ số)		Score (Điểm)
Categories (Danh mục)	Social Impact (Tác động xã hội)	100,00%
	Environmental Impact (Tác động môi trường)	97,30%
	Governance (Quản trị)	98,50%
Performance Lenses (Lăng kính hiệu suất)	Equality (Bình đẳng)	99,40%
	Knowledge Transfer (Chuyển giao tri thức)	98,50%
	Educating for Society (Giáo dục phục vụ xã hội)	97,10%
	Employment Opportunities (Cơ hội và khả năng có việc làm)	97,70%
	Life Quality (Chất lượng cuộc sống)	97,40%
	Sustainable Institution (Cơ sở giáo dục bền vững)	91,00%
	Sustainable Education (Giáo dục bền vững)	99,70%
	Sustainable Research (Nghiên cứu bền vững)	98.50%
	Overall (Tổng thể)	100,00%

(Nguồn: QS World University Rankings, 2025)

Bảng 1 cho thấy UofT đạt điểm tuyệt đối ở tác động xã hội (100%), thể hiện qua các sáng kiến cộng đồng như sự kiện "Adams Celebration" (2023), thu hút hơn 10.000 người tham gia, tăng 200% so với năm trước. Quản trị đạt 98,5%, nhờ 90% quyết định đầu tư tuân thủ nguyên tắc ESG (Environmental, Social, Governance), minh chứng cho sự minh bạch

và trách nhiệm. Giáo dục môi trường (99,7%) và bình đẳng (99,4%) nổi bật với việc tích hợp PTBV vào 29% khóa học cử nhân, tương đương 2.000 khóa và hỗ trợ hơn 5.300 sinh viên tham gia học tập thực nghiệm. Tuy nhiên, chỉ số bền vững môi trường (91%) là điểm thấp nhất, dù đã tăng từ 90,5% năm 2023, cho thấy UofT cần đẩy mạnh hơn để đạt mục tiêu trung hòa carbon trước 2050; Hiện tại, trường đã giảm 37% từ 150.000 tấn CO2 năm 2021 xuống 94.500 tấn năm 2023 (University of Toronto, 2023).

Sự tiến bộ của UofT qua 3 năm được thể hiện trong bảng sau:

Bảng 2. So sánh chỉ số bền vững của UofT từ 2023-2025

Chỉ số	2023	2024	2025	Thay đổi 2023-2025
Social Impact (Tác động xã hội)	96,50%	98,80%	100,00%	+3,5%
Environmental Impact (Tác động môi trường)	92,30%	98,40%	97,30%	+5,0%
Governance (Quản trị)	-	98,60%	98,50%	-
Sustainable Institution (Cơ sở giáo dục bền vững)	88,10%	93,80%	91,00%	+2,9%
Sustainable Education (Giáo dục bền vững)	93,60%	98,70%	99,70%	+6,1%
Sustainable Research (Nghiên cứu bền vững)	92,20%	97,90%	98,50%	+6,3%
Overall (Tổng thể)	**94,90%**	**100,00%**	**100,00%**	**+5,1%**

(Nguồn: QS World University Rankings, 2023, 2024, 2025)

Bảng 2 minh họa sự ổn định của các chỉ số đánh giá từ 2023-2025 của UofT theo QS. Các chỉ số như tác động xã hội tăng từ 96,50% lên 100%, chỉ số tổng thể có sự cải thiện đáng kể, từ 94,90% năm 2023 và duy trì ổn định mức 100% trong năm 2024 và 2025. Các chỉ số về giáo dục và nghiên cứu cũng tăng trên 6% nhờ đầu tư 50 triệu CAD (2023-2025) vào hơn 120 đơn vị nghiên cứu, tập trung vào các giải pháp khí hậu. Các sáng kiến nổi bật bao gồm: (1) Cam kết trung hòa carbon trước 2050 tại khuôn viên St. George, với việc ngừng đầu tư vào nhiên liệu hóa thạch từ 2022 để chuyển đổi sang nguồn năng lượng sạch; (2) Chương trình Pathways mở rộng giáo dục PTBV với 115 chương trình sau đại học, hỗ trợ sinh viên qua các dự án thực tế như Living Labs; (3) Hợp tác với 15 mạng lưới khí hậu toàn cầu (U7+, UC3, ISCN), tăng 31% sinh viên tham gia "Sustainability Scholar" từ 1.600 (2022) lên 2.100 (2023) tạo ra thế hệ lãnh đạo bền vững (University of Toronto, 2023).

3.2. Thành tựu của ETH Zurich

ETH Zurich có những thành tựu vượt trội về các chỉ số xếp hạng bền vững khi đứng vị trí thứ 75 trong bảng xếp hạng QS năm 2023 đến vị trí thứ 18 năm 2024 và xuất sắc nhất là vị trí thứ 2 trên toàn thế giới năm 2025. Kết quả chi tiết được trình bày trong bảng 3 dưới đây:

Bảng 3. Kết quả xếp hạng về tính bền vững của ETH Zurich năm 2025

Indicator (Chỉ số)		Score (Điểm)
Categories (Danh mục)	Social Impact (Tác động xã hội)	96,70%
	Environmental Impact (Tác động môi trường)	100,00%
	Governance (Quản trị)	98,00%
Performance Lenses (Lăng kính hiệu suất)	Equality (Bình đẳng)	87,00%
	Knowledge Transfer (Chuyển giao tri thức)	99,30%
	Educating for Society (Giáo dục phục vụ xã hội)	94,10%
	Employment Opportunities (Cơ hội và khả năng có việc làm)	99,40%
	Life Quality (Chất lượng cuộc sống)	99,20%
	Sustainable Institution (Cơ sở giáo dục bền vững)	100,00%
	Sustainable Education (Giáo dục bền vững)	98,40%
	Sustainable Research (Nghiên cứu bền vững)	99,50%
	Overall (Tổng thể)	**99,60%**

(Nguồn: QS World University Rankings, 2025)

Bảng 3 cho thấy chỉ số tác động môi trường của ETH Zurich đạt 100% nhờ triển khai dự án NEST HiLo, đây là một mô - đun hai tầng bổ sung cho cấu trúc tòa nhà nghiên cứu NEST, giúp giảm 70% lượng bê tông và 90% lượng thép và góp phần giảm phát thải CO_2 cho ngành xây dựng. Bên cạnh đó, chỉ số về cơ sở giáo dục bền vững cũng đạt 100% cho thấy thành công của Trường trong việc triển khai hệ thống quản lý năng lượng thông minh và mở rộng các phòng thí nghiệm bền vững như "Energy Science Center". Chỉ số Bình đẳng đạt 87% tuy thấp nhất trong các chỉ số nhưng vẫn cho thấy ETH đã có những giải pháp tương đối hiệu quả trong việc đảm bảo công bằng trong giáo dục và cơ hội cho nữ giới, tuy nhiên đây là lĩnh vực cần tiếp tục cải tiến để đạt sự tương đồng với các chỉ số khác và nâng cao tỉ lệ chỉ số tổng thể.

Sự tiến bộ của ETH Zurich từ 2023-2025 năm được thể hiện trong bảng sau:

Bảng 4. So sánh chỉ số bền vững của ETH Zurich từ 2023-2025

Chỉ số	2023	2024	2025	Thay đổi 2023-2025
Social Impact (Tác động xã hội)	73,10%	95,10%	96,70%	+23,6%
Environmental Impact (Tác động môi trường)	65,20%	89,80%	100,00%	+34,8%
Governance (Quản trị)	-	88,20%	98,00%	-
Sustainable Institution (Cơ sở giáo dục bền vững)	43,70%	86,90%	100,00%	+56,5%
Sustainable Education (Giáo dục bền vững)	67,20%	93,50%	98,40%	+31,2 %
Sustainable Research (Nghiên cứu bền vững)	96,70%	83,70%	99.50%	+2,8%
Overall (Tổng thể)	**67,50%**	**93,10%**	**99,60%**	**+32,1%**

(Nguồn: QS World University Rankings, 2023, 2024, 2025)

Bảng 4 cho thấy trong giai đoạn 2023-2025, ETH Zurich có những bước nhảy vọt trong các chỉ số PTBV, chỉ số tác động xã hội tăng 23,6% nhờ các sáng kiến như chiến dịch "Design for all" nâng cao nhận thức về quyền tiếp cận cho người khuyết tật, cùng với sự mở rộng của "Botnar Research Centre for Child Health" (BRCCH) với thêm 50 triệu CHF tài trợ năm 2023, hỗ trợ sức khỏe cho trẻ em toàn cầu. Tác động môi trường tăng 34,8% được thúc đẩy bởi roadmap giảm phát thải khí nhà kính, dự án "Nachhaltige Gastronomie" giảm CO_2 trong chuỗi cung ứng thực phẩm và ứng dụng năng lượng tái tạo. Chỉ số cơ sở giáo dục bền vững với mức tăng ấn tượng 56,6% nhờ đầu tư cơ sở hạ tầng xanh và công nghệ tiết kiệm năng lượng. Nghiên cứu bền vững tăng nhẹ nhờ hơn 29 dự án đa ngành tại BRCCH và nhiều giải thưởng quốc tế cho nghiên cứu đột phá. Riêng chỉ số về quản trị đạt 98% năm 2025 cho thấy trường thành công trong việc áp dụng tiêu chuẩn kế toán IPSAS giúp minh bạch tài chính. Về tổng thể, chỉ số tăng từ 67,5% lên 99,6% đã khẳng định ETH Zurich là hình mẫu về PTBV thông qua chiến lược toàn diện từ nâng cao chất lượng cơ sở vật chất đến cải cách giáo dục và tăng cường hợp tác xã hội, bảo vệ môi trường.

3.3. So sánh giữa UofT và ETH Zurich

Sự khác biệt giữa UofT và ETH Zurich trong việc thúc đẩy PTBV được thể hiện rõ qua kết quả xếp hạng QS Sustainability Rankings 2025, phản ánh các chiến lược và ưu tiên riêng biệt của hai trường. Bảng dưới đây so sánh chi tiết các chỉ số chính:

Bảng 5. So sánh UofT và ETH Zurich

Chỉ số	UofT	ETH	So sánh UofT-ETH
Social Impact (Tác động xã hội)	100,00%	96,70%	3,3%
Environmental Impact (Tác động môi trường)	97,30%	100,00%	-2,7%
Governance (Quản trị)	98,50%	98,00%	0,5%
Sustainable Institution (Cơ sở giáo dục bền vững)	91,00%	100,00%	-9%
Sustainable Education (Giáo dục bền vững)	99,70%	98,40%	1,3%
Sustainable Research (Nghiên cứu bền vững)	98,50%	99.50%	-1%
Overall (Tổng thể)	**100,00%**	**99,60%**	**0,4%**

(Nguồn: QS World University Rankings, 2025)

Qua bảng 5 cho thấy UofT cao hơn và cũng thấp hơn ETH Zurich 3 chỉ số (cao hơn về tác động xã hội, quản trị và

giáo dục bền vững, thấp hơn về tác động môi trường, cơ sở giáo dục bền vững và nghiên cứu bền vững). Có thể thấy, UofT vượt trội về tác động xã hội và giáo dục bền vững, đạt điểm tuyệt đối 100% tổng thể nhờ tích hợp PTBV sâu vào giáo dục và nghiên cứu, với hơn 5.300 sinh viên tham gia học tập thực nghiệm mỗi năm và ngân sách 50 triệu CAD (2023-2025) cho 120 đơn vị nghiên cứu như SDGs@UofT. Chỉ số quản trị cao (98,5%) đến từ việc 90% quyết định đầu tư tuân thủ nguyên tắc ESG, trong khi tác động xã hội (100%) được củng cố qua các sự kiện như "Adams Celebration". Tuy nhiên, bền vững môi trường (91%) là điểm yếu, dù đã cải thiện từ 90,5% năm 2023 (University of Toronto, 2023). Đối với ETH Zurich, 2 chỉ số đi đầu là tác động môi trường và cơ sở giáo dục bền vững đều đạt 100%, nhờ áp dụng sáng kiến Net Zero, tập trung giảm khí thải CO_2 và tối ưu hóa nguồn năng lượng tái tạo trong khuôn viên trường cũng như tăng cường tiết kiệm nước. Đồng thời ETH Zurich cũng triển khai đồng bộ dự án xây dựng xanh theo tiêu chuẩn NEST HoLo. Bên cạnh đó chỉ số nghiên cứu bền vững cũng đạt 99,5% nhờ tập trung vào công nghệ điện mặt trời, lưu trữ năng lượng và đẩy mạnh tái chế. Dù vậy, ETH Zurich có điểm tác động xã hội thấp hơn UofT 3,3% do tập trung vào việc nghiên cứu công nghệ bền vững hơn là các dự án cộng đồng quy mô lớn.

UofT và ETH Zurich minh chứng rằng GDĐH có thể dẫn dắt PTBV thông qua giáo dục quy mô lớn, nghiên cứu đột phá và quản trị hiệu quả, đồng thời cung cấp các giải pháp chi phí thấp giúp bảo vệ tài nguyên và môi trường. Những bài học này đặt nền tảng cho Việt Nam phát triển các chiến lược phù hợp với tiềm năng hướng tới việc đạt được các mục tiêu bền vững.

3.4. Đề xuất và trao đổi

Để GDĐH trở thành cầu nối hiệu quả trong việc thúc đẩy PTBV tại Việt Nam, cần học hỏi các các mô hình tiên tiến từ UofT và ETH Zurich để xây dựng một chiến lược tổng thể trong đó có sự cân bằng giữa giáo dục, nghiên cứu, công nghệ và quản trị. Các giải pháp sau có thể giúp các trường đại học Việt Nam tận dụng nguồn lực sẵn có để đẩy mạnh giáo dục gắn với PTBV như:

Thứ nhất, kết hợp hài hòa và hiệu quả nội dung PTBV vào chương trình giảng dạy theo hướng địa phương hóa, phù hợp với định hướng của mỗi trường và tiềm năng sẵn có của địa phương. Học hỏi mô hình Pathway của UofT các trường có thể đưa vấn đề như xâm nhập mặn ở Đồng bằng sông Cửu Long và năng lượng tái tạo vào hoạt động giảng dạy và nghiên cứu cụ thể. Ví dụ, Trường Đại học Kinh tế Quốc dân (NEU) đã triển khai các khóa học về kinh tế xanh và quản lý bền vững (NEU, 2023), phù hợp với nhu cầu phát triển kinh tế bền vững của miền Bắc. Tương tự, Đại học Phenikaa tích hợp công nghệ xanh vào chương trình kỹ thuật, như các khóa học về năng lượng tái tạo (Phenikaa University, 2023). Đồng thời, việc sử dụng công nghệ thực tế ảo (VR) để mô phỏng tác động của biến đổi khí hậu và kết hợp trí tuệ nhân tạo cũng là phương pháp hiệu quả để tăng cường sự tiếp nhận kiến thức cho người học cũng như năng cao các kỹ năng xanh trong quá trình thực hiện như cách Đại học Kinh tế TP.HCM (UEH) sử dụng công nghệ để hỗ trợ giảng dạy về kinh tế tuần hoàn giúp nâng cao kỹ năng xanh thông qua các dự án cộng đồng.

Thứ hai, triển khai và tập trung mạnh mẽ nguồn lực vào các hoạt động nghiên cứu và đổi mới gắn liền với ứng dụng thực tiễn, tương tự như cách ETH Zurich phát triển pin năng lượng mặt trời và công nghệ thu hồi CO_2. Đại học Thương mại (TMU) đã triển khai các dự án về logistics xanh và chuỗi cung ứng bền vững (TMU, 2024), trong khi Đại học Phenikaa nghiên cứu công nghệ môi trường như xử lý nước thải (Phenikaa University, 2023). Các trường ở Việt Nam có thể học hỏi để tăng cường các hợp tác, công bố quốc tế các nghiên cứu có tác động toàn cầu, triển khai và hỗ trợ tích cực các dự án có hướng nghiên cứu về nông nghiệp bền vững, dự án về công nghệ môi trường hay năng lượng xanh.

Thứ ba, xây dựng văn hóa bền vững thông qua chiến lược quản lý môi trường đồng bộ như trang bị hệ thống năng lượng mặt trời, hạn chế tối đa sử dụng nhựa dùng một lần, tăng cường hoạt động tái chế và huy động lực lượng người học cùng cộng đồng thực hiện các dự án cải thiện môi trường gắn với thực trạng của chính cơ sở giáo dục và địa phương. Đại học Phenikaa đã trang bị hệ thống quản lý năng lượng thông minh trong khuôn viên (Phenikaa University, 2023), còn Đại học Kinh tế Quốc dân thực hiện số hóa để giảm lãng phí tài nguyên (NEU, 2023).

Thứ tư, qua mô hình hợp tác "TransformTO" của UofT có thể thấy sự thành công của chiến lược hợp tác ba bên "Trường đại học – Doanh nghiệp – Chính phủ". Như Đại học Kinh tế TP.HCM (UEH) đã hợp tác với các đối tác quốc tế về giáo dục bền vững (CELG, n.d.), trong khi Đại học Thương mại liên kết với doanh nghiệp logistics để phát triển công nghệ xanh (TMU, 2024). Các trường đại học ở Việt Nam có thể liên kết với các tập đoàn lớn để tích hợp kỹ năng xanh vào chương trình đồng thời phối hợp với các bên trong việc triển khai các hợp tác phát triển địa phương và chuyển giao

công nghệ cho cộng đồng và doanh nghiệp.

Thứ năm, nâng cao chất lượng đội ngũ nguồn nhân lực bền bững thông qua đào tạo cán bộ về PTBV bao gồm năng lực nghiên cứu, quản lý và áp dụng công nghệ mới. Đại học Phenikaa đặt mục tiêu đào tạo đội ngũ kỹ sư công nghệ xanh (Phenikaa University, 2023), trong khi UEH chú trọng phát triển nhân lực kinh tế bền vững (CELG, n.d.). Bên cạnh đó, Việt Nam cũng cần tăng tỷ lệ nữ tham gia trong lĩnh vực STEM như bài học từ chương trình hỗ trợ nữ sinh của ETH Zurich nhằm tăng cường bình đẳng và đa dạng trong lĩnh vực công nghệ.

Thứ sáu, quản trị bền vững theo tiêu chuẩn ESG như UofT đã làm. Việt Nam có thể lập kế hoạch và đặt ra các tiêu chuẩn về PTBV như giảm lượng phát thải thấp hơn 30% vào năm 2035, 20% điện năng tiêu thụ ở các trường là từ năng lượng tái tạo. Đại học Kinh tế Quốc dân đã bắt đầu số hóa quản trị để tối ưu tài nguyên (NEU, 2023), còn Đại học Phenikaa công bố báo cáo PTBV minh bạch (Phenikaa University, 2023). Các trường cần công bố các báo cáo về PTBV minh bạch theo các tiêu chuẩn quốc tê để đo lường hiệu quả PTBV theo tiêu chuẩn khoa học.

4. KẾT LUẬN

Giáo dục đại học không đơn thuần mang đến cho người học tri thức mà còn là động lực cốt lõi để hướng người học có tư duy, hành vi và giải pháp để PTBV. Các trường đại học không chỉ có cơ hội mà còn có trách nhiệm với xã hội trong việc phát triển các giải pháp sáng tạo cho những thách thức mang tính toàn cầu. Thành công của UofT và ETH Zurich trong việc tích hợp PTBV vào chương trình đào tạo, triển khai áp dụng công nghệ xanh và năng lượng tái tạo để giảm lượng phát phải CO_2 có thể minh chứng rằng GDĐH hoàn toàn có thể nâng cao chất lượng giáo dục, tăng cường lợi ích cho cộng đồng và dẫn dắt xã hội hướng tới sự bền vững.

Với Việt Nam, nơi giáo dục còn hạn chế trong việc tích hợp PTBV, sinh viên thiếu kỹ năng xanh và các trường chưa tối ưu hóa nguồn năng lượng tái tạo, việc tận dụng các tiềm năng địa phương như năng lượng gió, năng lượng mặt trời và hệ sinh thái Đồng bằng sông Cửu Long là chìa khóa để khắc phục những thách thức này. Bằng cách học hỏi từ UofT và ETH Zurich, GDĐH Việt Nam có thể tạo ra các thế hệ người học không chỉ vững về kiến thức mà còn có năng lực ứng dụng và hành động. Các giải pháp như ứng dụng thực tế ảo trong giảng dạy để mô phỏng sự biến đổi khí hậu, triển khai hợp tác với các tập đoàn để đào tạo kỹ năng xanh giải quyết vấn đề địa phương và nghiên cứu chuyển giao công nghệ, phát triển khuôn viên bền vững không chỉ giúp giảm thiểu ô nhiễm nước thải, tăng cường khả năng thích ứng với biến đổi khí hậu mà còn phát triển năng lực cho nguồn nhân lực theo nền kinh tế xanh.

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HỌC TẬP SUỐT ĐỜI TRONG KỶ NGUYÊN SỐ: RÀO CẢN, VAI TRÒ CÔNG NGHỆ VÀ GIẢI PHÁP TỪ GÓC NHÌN CỦA GIÁO VIÊN VÀ CÁN BỘ QUẢN LÝ GIÁO DỤC

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TÓM TẮT

Bài báo phân tích nhu cầu và tầm quan trọng của học tập suốt đời trong bối cảnh số hóa toàn cầu, tập trung vào giảng viên và cán bộ quản lý giáo dục tại Việt Nam. Nghiên cứu chỉ ra rằng, cách mạng công nghiệp 4.0 và số hóa đã gia tăng nhu cầu kỹ năng mới, yêu cầu hệ thống giáo dục hỗ trợ học tập liên tục. Công nghệ đóng vai trò quan trọng trong việc mở rộng tiếp cận học tập qua các nền tảng trực tuyến (MOOCs), AI và công nghệ di động, tuy nhiên vẫn gặp thách thức về kỹ năng số và chênh lệch hạ tầng giữa các khu vực. Bài báo đề xuất các giải pháp thúc đẩy học tập suốt đời tại Việt Nam, bao gồm xây dựng chiến lược quốc gia, đầu tư hạ tầng công nghệ, đào tạo kỹ năng số cho giáo viên và cán bộ quản lý, và tăng cường hợp tác công tư. Kinh nghiệm quốc tế từ các quốc gia khác được xem xét để rút ra bài học phù hợp với Việt Nam.

Từ khóa: Chính sách giáo dục, Công nghệ giáo dục, Học tập suốt đời, Số hóa giáo dục, Rào cản học tập.

1. GIỚI THIỆU

1.1. Khái quát về xu hướng học tập suốt đời (HTSĐ) trên thế giới

HTSĐ là một khái niệm được nhấn mạnh trong các chính sách giáo dục toàn cầu, đặc biệt từ cuối thế kỷ 20. Theo UNESCO (1972), HTSĐ không chỉ là trách nhiệm của hệ thống giáo dục (HTGD) mà còn là yếu tố cốt lõi để phát triển cá nhân và xã hội. Các quốc gia phát triển như Phần Lan, Hàn Quốc, và Đức đã xây dựng HTGD liên tục, từ giáo dục chính quy, không chính quy đến giáo dục thường xuyên, nhằm đáp ứng nhu cầu kỹ năng của công dân trong bối cảnh thay đổi nhanh chóng. Đồng thời, sự gia tăng của các nền tảng học trực tuyến như Coursera, Udemy, EdX và các tài nguyên học tập mở (OER) đã thúc đẩy khả năng tiếp cận tri thức mọi lúc, mọi nơi. Illeris (2016) chỉ ra rằng HTSĐ không chỉ đáp ứng nhu cầu cá nhân mà còn đóng vai trò quan trọng trong việc nâng cao năng lực cạnh tranh của lực lượng lao động toàn cầu.

1.2. Vai trò của HTSĐ trong bối cảnh kĩ nguyên số và hội nhập toàn cầu

Kĩ nguyên số (KNS) và sự hội nhập toàn cầu đã thay đổi cách con người học tập và làm việc. Công nghệ số hóa tạo điều kiện cho mọi người tiếp cận tri thức, nâng cao kỹ năng và thích nghi với thị trường lao động đang thay đổi. Schwab (2016) cho rằng cách mạng công nghiệp 4.0 không chỉ mang đến cơ hội mà còn đặt ra thách thức lớn về khoảng cách kỹ năng, đặc biệt trong các lĩnh vực như AI, dữ liệu lớn và tự động hóa. Do đó, HTSĐ trở thành yêu cầu cấp bách để duy trì sự cạnh tranh và thích nghi trong bối cảnh hội nhập. Đối với các quốc gia đang phát triển như Việt Nam, HTSĐ đóng vai trò quan trọng trong việc giảm chênh lệch kỹ năng và đảm bảo sự phát triển bền vững (Tô Lâm, 2025).

Bài báo này tập trung vào ba vấn đề chính về HTSĐ trong KNS. Thứ nhất, phân tích tầm quan trọng của HTSĐ và các rào cản như thiếu thời gian, tài chính, kỹ năng công nghệ, và động lực học tập. Thứ hai, làm rõ vai trò của công nghệ trong cá nhân hóa, mở rộng tiếp cận tri thức và kết nối người học toàn cầu. Cuối cùng, đề xuất các giải pháp như đầu tư công nghệ, đào tạo kỹ năng số, hỗ trợ tài chính, và tăng cường hợp tác công tư để thúc đẩy HTSĐ tại Việt Nam.

2. BỐI CẢNH VÀ TẦM QUAN TRỌNG CỦA HTSĐ TRONG BỐI CẢNH SỐ HÓA TOÀN CẦU

2.1. Những thay đổi trong xã hội và thị trường lao động

Cách mạng công nghiệp 4.0 và sự bùng nổ của công nghệ số đã làm thay đổi sâu sắc cách con người làm việc và học tập. Schwab (2016) chỉ ra rằng việc tích hợp các công nghệ mới như trí tuệ nhân tạo (AI), Internet vạn vật (IoT), và dữ liệu lớn (Big Data) đang tái định hình thị trường lao động toàn cầu, khiến các kỹ năng truyền thống nhanh chóng trở nên lỗi thời. OECD (2019) cũng nhấn mạnh rằng lực lượng lao động hiện nay cần phải liên tục thích nghi với những yêu cầu

mới, từ kỹ năng kỹ thuật số đến tư duy sáng tạo. HTSĐ vì thế trở thành một nhu cầu tất yếu để duy trì năng lực cạnh tranh, không chỉ trên phạm vi cá nhân mà còn ở cấp độ tổ chức và quốc gia.

2.2. Tâm lý và thói quen học tập mới của người dân

Trong KNS, người học không còn phụ thuộc vào các chương trình giáo dục chính quy truyền thống. Học tập không chính quy qua các nền tảng trực tuyến như Coursera, Udemy, EdX và các tài nguyên học tập mở (OER) đã trở thành xu hướng phổ biến. Illeris (2016) nhận định rằng nhu cầu học tập tự định hướng tăng mạnh nhờ khả năng tiếp cận tri thức mọi lúc, mọi nơi qua công nghệ di động và Internet. Điều này không chỉ giúp người học linh hoạt hơn mà còn thúc đẩy quá trình tự học và cá nhân hóa lộ trình học tập. Tại Việt Nam, sự phát triển mạnh mẽ của các nền tảng học trực tuyến trong nước như VioEdu, Kyna hay Edmicro đã tạo điều kiện cho người học ở mọi độ tuổi dễ dàng tham gia vào quá trình học tập liên tục.

2.3. Lý thuyết về Học tập suốt đời

Lý thuyết về HTSĐ trong bối cảnh số hóa toàn cầu đóng vai trò như một khung lý thuyết, nhấn mạnh tầm quan trọng của việc học tập liên tục, linh hoạt và thích ứng suốt đời, đặc biệt trong thời kỳ phát triển mạnh mẽ của công nghệ kỹ thuật số. Lý thuyết này không chỉ củng cố nền tảng khoa học cho các kết quả và đề xuất của nghiên cứu mà còn phản ánh tính hệ thống cũng như bối cảnh thực tiễn của HTSĐ trong thời đại số hóa.

Tại Việt Nam, Phạm Thị Ly là một trong những nhà nghiên cứu nổi bật với nhiều đóng góp quan trọng trong lĩnh vực giáo dục đại học và HTSĐ (Phạm, T. L., 2019). Ở phạm vi quốc tế, các nghiên cứu của Jarvis (2004) và Field (2006) đã mở rộng phạm vi của HTSĐ, không chỉ giới hạn trong giáo dục truyền thống mà còn bao gồm việc học thông qua các nền tảng kỹ thuật số như MOOCs, công nghệ EdTech và tài nguyên học tập mở. Những khía cạnh này cung cấp cơ sở khoa học để hiểu rõ hơn về cách con người tiếp cận và sử dụng tri thức trong thế kỷ 21, đồng thời phát triển kỹ năng số và thúc đẩy sự đổi mới sáng tạo.

Trong nghiên cứu này, lý thuyết HTSĐ đóng vai trò định hướng trong việc khảo sát, phân tích dữ liệu và đề xuất các giải pháp nhằm phát triển HTGD trong bối cảnh toàn cầu hóa và chuyển đổi số.

2.4. Mô hình HTSĐ từ các quốc gia tiên tiến: Phần Lan, Hàn Quốc, Singapore

HTSĐ đã trở thành xu hướng trọng tâm trong các chiến lược phát triển nguồn nhân lực tại các quốc gia tiên tiến. Phần Lan, Hàn Quốc và Singapore đã triển khai các mô hình HTSĐ, đồng thời tận dụng công nghệ để thúc đẩy lĩnh vực này.

Phần Lan: Mô hình học tập dựa trên sự linh hoạt và đổi mới giáo dục có đặc điểm nổi bật như (1) tư duy đổi mới trong giáo dục, trong đó Phần Lan xây dựng HTGD đề cao sự tự định hướng và khả năng học tập độc lập của người học, và (2) tận dụng công nghệ số với các nền tảng học trực tuyến quốc gia như "Digicampus", nơi cung cấp khóa học miễn phí cho mọi tầng lớp xã hội. Skill Shift Finland là một sáng kiến quốc gia giúp người lao động nâng cao kỹ năng số qua các khóa học trực tuyến liên quan đến dữ liệu lớn, AI và bảo mật thông tin (UNESCO, 2020).

Hàn Quốc: Nổi bật với mô hình học tập gắn liền với chuyển đổi số quốc gia. Chính phủ Hàn Quốc triển khai nền tảng học tập trực tuyến K-MOOC (Korea Massive Open Online Courses), cung cấp hàng nghìn khóa học miễn phí về kỹ thuật, khoa học và kỹ năng mềm cho tất cả công dân. Smart Work Training Center là một trung tâm đào tạo trực tuyến lớn, cung cấp các khóa học về phát triển ứng dụng, học máy (machine learning) và thương mại điện tử, nhằm chuẩn bị nguồn lao động cho nền kinh tế số (K-MOOC, 2020).

Singapore: Phát triển chương trình quốc gia "SkillsFuture", cho phép công dân từ 25 tuổi trở lên nhận khoản tín dụng để tham gia các khóa học nâng cao kỹ năng. MySkillsFuture là một nền tảng cung cấp các khóa học về công nghệ mới nổi như AI, blockchain và thiết kế UX/UI (SkillsFuture, 2020). Chính phủ Singapore tổ chức các khóa học từ cơ bản đến nâng cao nhằm nâng cao năng lực công nghệ cho người dân (AI Singapore Initiative, 2020).

Bài học cho Việt Nam

– Đầu tư vào công nghệ: Việt Nam cần xây dựng nền tảng học tập trực tuyến quốc gia dễ tiếp cận, đa dạng hóa nội dung và cá nhân hóa lộ trình học tập.

– (2) Chính sách khuyến khích học tập: Việt Nam có thể học hỏi từ Singapore trong việc cung cấp tín dụng đào tạo để khuyến khích người dân đầu tư cho giáo dục cá nhân.

– (3) Hợp tác công tư: Hàn Quốc đã chứng minh rằng sự hợp tác giữa chính phủ và doanh nghiệp là cách hiệu quả để nâng cao kỹ năng lao động.

3. THỰC TRẠNG HTSĐ TẠI VIỆT NAM

HTSĐ tại Việt Nam đã đạt được những thành tựu đáng kể, đặc biệt trong việc mở rộng cơ hội học tập cho nhiều nhóm đối tượng khác nhau. Chính phủ đã ban hành các chính sách như Đề án 89 (2020) về nâng cao năng lực đội ngũ giáo viên (GV) và cán bộ giáo dục (CBQL) đại học. Tuy nhiên, vẫn tồn tại nhiều thách thức. Nhận thức về HTSĐ ở nhiều địa phương còn hạn chế, cơ sở hạ tầng công nghệ chưa đồng bộ, và nội dung học tập còn thiếu sự phong phú và phù hợp với nhu cầu thực tế. Theo Hoàng Tùng (2021), một số giáo viên và cán bộ quản lí (CBQL) giáo dục vẫn gặp khó khăn trong việc sử dụng các công cụ số để hỗ trợ quá trình học tập và giảng dạy.

Phương pháp thu thập dữ liệu của nghiên cứu này chủ yếu dựa vào khảo sát qua bảng hỏi. Nghiên cứu tập trung vào thu thập ý kiến từ các cá nhân và tổ chức liên quan đến chủ đề "HTSĐ trong KNS" nhằm đánh giá thực trạng và đề xuất giải pháp thúc đẩy HTSĐ tại Việt Nam.

Dữ liệu thu thập trong nghiên cứu này được xử lý bằng các phương pháp định lượng như phân tích thống kê, bao gồm tính toán tỷ lệ phần trăm, tần suất các câu hỏi về sự sẵn sàng tích hợp công nghệ giáo dục (CNGD) và vai trò của các rào cản đối với HTSĐ. Đồng thời, có sử dụng phân tích định tính để xử lý các đề xuất, góp ý của người tham gia về việc thúc đẩy HTSĐ. Chúng tôi đã chọn mẫu khảo sát đa dạng và đại diện cho đối tượng nghiên cứu, đảm bảo thu thập thông tin thực tiễn và phản ánh đầy đủ các vấn đề quan trọng. Những điều này góp phần nâng cao tính tin cậy của kết quả nghiên cứu. Sau đây là kết qủa khảo sát của chúng tôi:

3.1. Những thông tin cơ bản

Tổ chức khảo sát online 110 người công tác trong lĩnh vực giáo dục, trong đó có 83 giáo viên (75.5%), 6 giảng viên/Nhà nghiên cứu (5.5%), 11 là CBQL giáo dục (10%); 7 sinh viên (6.48%), 3 chuyên gia/Nhà tuyển dụng (2.7%)

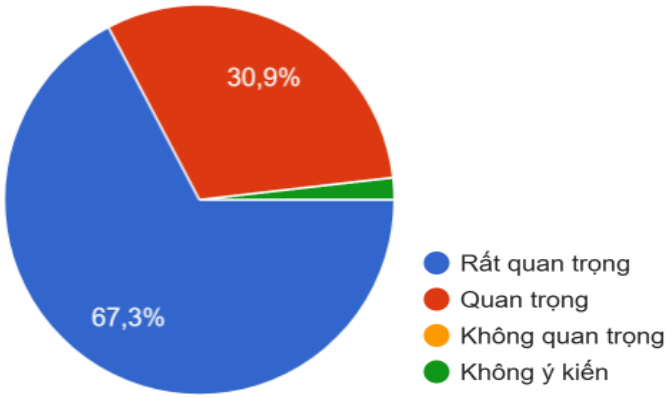
Độ tuổi: Dưới 25 tuổi có 16 người (14.5%); từ 25-40 tuổi có 50 người (45.5%); từ 41-60 tuổi có 43 người (39.0%); Trên 60: 1 người (0.9%)

Kết qủa khảo sát cho thấy có 109 người (99.1%) giáo viên và CBQL sử dụng công nghệ để học tập hoặc làm việc, chỉ 0.9% không sử dụng. Đây là một dấu hiệu tích cực cho thấy phần lớn người tham gia đã nhận thức được vai trò của công nghệ. Tuy nhiên, vẫn còn tỷ lệ 0.9% chưa sử dụng, phản ánh một phần nhỏ còn chưa tiếp cận hoặc bị hạn chế bởi các yếu tố như điều kiện cá nhân hoặc thiếu hạ tầng công nghệ.

3.2. Quan điểm về học tập suốt đời

3.2.1. Đánh giá về tầm quan trọng của HTSĐ trong KNS:

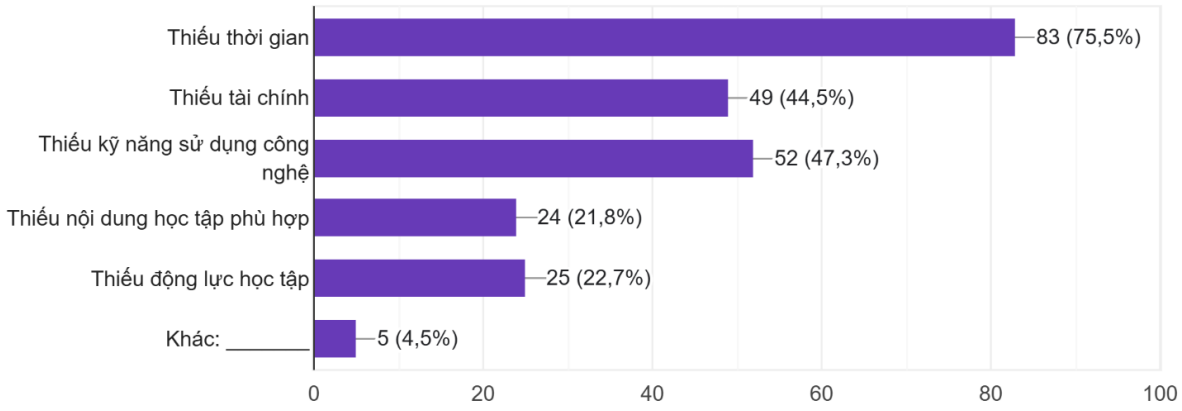
67.3% người tham gia đánh giá HTSĐ là "rất quan trọng", và 30.9% cho là "quan trọng". Không có ai cho rằng HTSĐ không quan trọng, chứng tỏ nhận thức về vai trò của việc học tập liên tục trong KNS đã rất cao. Tuy nhiên, có 2 người (1.8%) không có ý kiến, có thể do thiếu thông tin hoặc chưa có động lực để nhận thức tầm quan trọng của HTSĐ.



Biểu đồ 1. Đánh giá về tầm quan trọng của HTSĐ trong KNS (N=110)

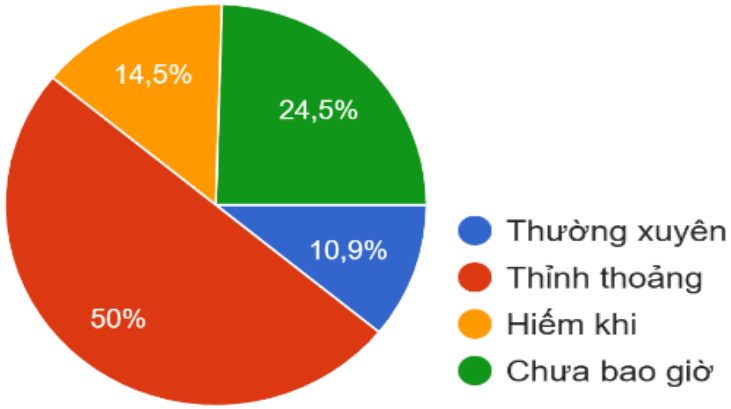
3.2.2. Rào cản lớn nhất đối với việc HTSĐ:

(1) Thiếu thời gian (75.5%); (2) Thiếu kỹ năng sử dụng công nghệ (47.3%); (3) Thiếu tài chính (44.5%). Các yếu tố này chỉ ra rằng HTSĐ vẫn đang bị ảnh hưởng nặng nề bởi những vấn đề về kỹ năng và nguồn lực. Để cải thiện tình hình, cần chú trọng vào việc đào tạo kĩ năng số và tối ưu hóa chi phí thông qua các chương trình miễn phí hoặc trợ cấp.



Biểu đồ 2. Rào cản lớn nhất đối với việc HTSĐ (N=110)

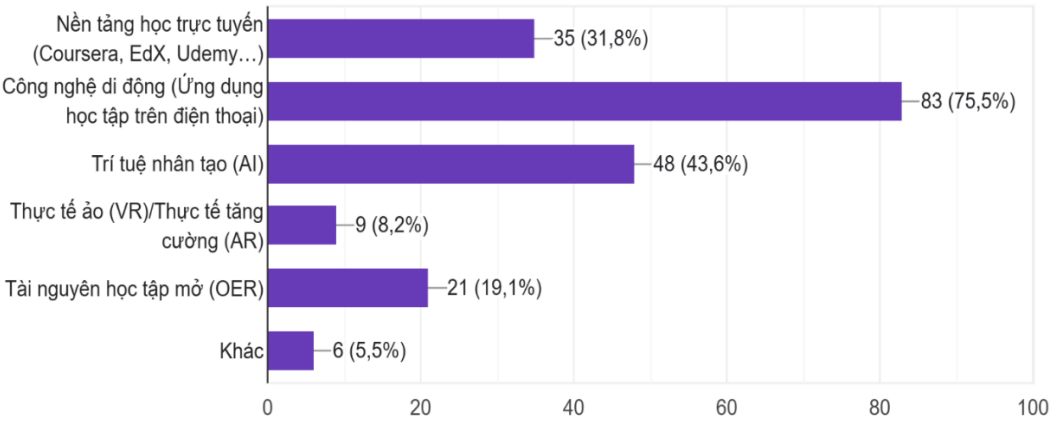
3.2.3. Mức độ thường xuyên sử dụng các nền tảng học trực tuyến (MOOCs, EdTech):



Biểu đồ 3. Tần suất sử dụng các nền tảng học trực tuyến

Chỉ 12 người (10.9%) tham gia khảo sát thường xuyên sử dụng các nền tảng học trực tuyến, trong khi có 27 người (24.4%) chưa bao giờ sử dụng. Điều này phản ánh thực trạng việc tiếp cận và sử dụng công nghệ học tập hiện đại chưa được phổ biến rộng rãi. Rào cản có thể do thiếu quen thuộc với các nền tảng, hoặc người dùng cảm thấy nội dung học chưa phù hợp với nhu cầu của họ.

3.2.4. Ảnh hưởng của công nghệ trong HTSĐ:



Biểu đồ 4. Các công nghệ ảnh hưởng lớn nhất cho HTSĐ (N=110)

Các công nghệ có ảnh hưởng lớn nhất là (1) Công nghệ di động (Ứng dụng học tập trên điện thoại): 83 (75.5%); AI có 48 (43.6%); Nền tảng học trực tuyến (Coursera, EdX, Udemy…): có 35 ý kiến (31.8%). Đây là những công nghệ có tiềm năng lớn trong việc hỗ trợ HTSĐ. Đặc biệt, AI có thể giúp cá nhân hóa quá trình học, làm tăng hiệu quả học tập. Tuy nhiên, tỷ lệ sử dụng các công nghệ tiên tiến như thực tế ảo (VR) chỉ 8.2% hay tài nguyên học tập mở (OER) có 19.1% là vẫn còn thấp, điều này cho thấy cần đẩy mạnh phổ biến và hỗ trợ người dùng trong việc tiếp cận những công nghệ này.

3.2.5. Giá trị của công nghệ trong tiếp cận HTSĐ

Bảng 1. Nhận thức về giá trị của công nghệ trong tiếp cận HTSĐ (N=110)

TT	*Giá trị của CNGD*	*Số lượng*	*Tỉ lệ*
1.	Tiếp cận được nội dung học phong phú	50	45.5
2.	Tăng sự linh hoạt về thời gian học	42	38.2
3.	Kết nối với cộng đồng học tập toàn cầu	17	15.5
4.	Không có thay đổi đáng kể	1	0.9

Kết qủa bảng 1 cho thấy:

– *Tiếp cận được nội dung học phong phú*

Gần một nửa số người tham gia khảo sát (45.5%) cho rằng công nghệ giúp họ tiếp cận được nội dung học phong phú. Điều này phản ánh rõ ràng vai trò quan trọng của các nền tảng học trực tuyến, ứng dụng học tập và tài nguyên học tập mở (OER) trong việc cung cấp nguồn học liệu đa dạng. Trong KNS, người học không còn bị giới hạn bởi sách vở hay giáo trình truyền thống mà có thể dễ dàng tiếp cận với các tài liệu từ khắp nơi trên thế giới. Điều này hỗ trợ mạnh mẽ cho việc HTSĐ, khi có thể tự do chọn lọc các nội dung phù hợp với nhu cầu phát triển cá nhân hoặc nghề nghiệp.

– *Tăng sự linh hoạt về thời gian học*

Một tỷ lệ đáng kể người tham gia (38.2%) cho rằng công nghệ mang lại sự linh hoạt trong thời gian học. Điều này là điểm mấu chốt của HTSĐ trong KNS, khi mà nhiều người trưởng thành hoặc GV, CBQL không có nhiều thời gian cố định để tham gia các khóa học truyền thống. Nhờ có các nền tảng học tập trực tuyến, họ có thể học mọi lúc mọi nơi, tuỳ theo lịch trình cá nhân. Sự linh hoạt này là yếu tố chính thu hút người học tiếp tục nâng cao kiến thức và kỹ năng của mình.

– *Kết nối với cộng đồng học tập toàn cầu*

Dù chỉ có 15.5% cho rằng công nghệ giúp họ kết nối với cộng đồng học tập toàn cầu, nhưng điều này vẫn rất quan trọng. Việc kết nối với các cộng đồng học tập trực tuyến mở ra cơ hội trao đổi kiến thức, chia sẻ kinh nghiệm và học hỏi từ các chuyên gia và người học trên toàn thế giới. Điều này không chỉ giúp mở rộng mạng lưới quan hệ mà còn mang lại những góc nhìn đa chiều, giúp người học tiếp cận các xu hướng mới và các phương pháp giảng dạy tiên tiến từ các quốc gia phát triển.

– *Không có thay đổi đáng kể*

Chỉ có một người (0.9%) cho rằng công nghệ không tạo ra thay đổi đáng kể trong quá trình học tập của họ. Đây là một tỷ lệ rất nhỏ, cho thấy phần lớn người tham gia khảo sát nhận thấy lợi ích rõ ràng của công nghệ đối với HTSĐ. Trường hợp cá nhân này có thể do điều kiện sử dụng công nghệ hạn chế hoặc không thấy sự khác biệt giữa việc học trực tuyến và học truyền thống. Điều này cũng phản ánh sự đa dạng trong khả năng tiếp cận và sử dụng công nghệ giữa các đối tượng GV, CBQL.

Như vậy, công nghệ đang đóng vai trò quan trọng trong việc thúc đẩy HTSĐ tại Việt Nam, đặc biệt trong việc tiếp cận nội dung học tập phong phú và tăng sự linh hoạt về thời gian. Tuy nhiên, để tối ưu hóa hơn nữa, cần đẩy mạnh việc xây dựng cộng đồng học tập toàn cầu và hỗ trợ những người chưa thấy sự thay đổi đáng kể trong quá trình học tập. Điều này đòi hỏi sự phát triển hơn nữa của các nền tảng công nghệ và sự phổ biến rộng rãi hơn của các công cụ giáo dục số.

3.2.6. Vai trò của EdTech trong việc thúc đẩy HTSĐ tại Việt Nam

Bảng 2. Nhận thức về vai trò của EdTech trong việc thúc đẩy HTSĐ tại Việt Nam (N=110)

TT	*Vai trò của EdTech*	*Số lượng*	*Tỉ lệ*
1.	Tạo điều kiện tiếp cận tài nguyên học tập đa dạng và phong phú.	69	62.7
2.	Nâng cao chất lượng giảng dạy và quản lý giáo dục.	24	21.8
3.	Hỗ trợ người học ở vùng sâu, vùng xa vượt qua rào cản địa lý.	7	6.4
4.	Cá nhân hóa lộ trình học tập của người học.	6	5.5
5.	Khác	4	3.6

Kết quả khảo sát bảng 2 cho thấy rõ EdTech đóng vai trò quan trọng trong việc thúc đẩy HTSĐ tại Việt Nam:

– *Tạo điều kiện tiếp cận tài nguyên học tập đa dạng và phong phú*

Phần lớn người tham gia khảo sát (62.7%) cho rằng EdTech đã giúp mở rộng khả năng tiếp cận tài nguyên học tập. Điều này rất quan trọng, bởi việc HTSĐ phụ thuộc lớn vào sự đa dạng và phong phú của các nguồn học liệu. Trong KNS, công nghệ giúp người học có thể tiếp cận vô số tài liệu, từ sách, bài giảng, đến các khóa học trực tuyến miễn phí hay có phí. Các nền tảng học tập như Coursera, EdX, và tài nguyên học tập mở (OER) cung cấp nhiều khóa học từ các trường đại học hàng đầu thế giới, giúp người học Việt Nam có thể dễ dàng tiếp cận tri thức toàn cầu mà không bị giới hạn về không gian hay thời gian.

– *Nâng cao chất lượng giảng dạy và quản lý giáo dục*

Khoảng 21.8% người tham gia khảo sát tin rằng EdTech có thể nâng cao chất lượng giảng dạy và quản lý giáo dục. Đây là một yếu tố quan trọng khi xét đến việc áp dụng công nghệ trong các hoạt động giáo dục truyền thống. Công nghệ không chỉ hỗ trợ giáo viên trong việc cung cấp nội dung bài giảng mà còn giúp cải thiện phương pháp giảng dạy thông qua các công cụ như AI, nền tảng đánh giá học sinh, và quản lý lộ trình học tập. Hơn nữa, EdTech còn giúp quản lý giáo dục hiệu quả hơn, từ việc phân tích dữ liệu học sinh đến giám sát chất lượng dạy học và điều chỉnh chương trình đào tạo cho phù hợp.

– *Hỗ trợ người học ở vùng sâu, vùng xa vượt qua rào cản địa lý*

Một tỷ lệ nhỏ (6.4%) đề cập đến vai trò của EdTech trong việc hỗ trợ người học ở vùng sâu, vùng xa vượt qua rào cản địa lý. Mặc dù tỷ lệ này không cao, nhưng đây là một yếu tố cực kỳ quan trọng đối với sự công bằng trong giáo dục. Nhờ có EdTech, người học ở các vùng khó khăn có thể tiếp cận với giáo dục chất lượng cao, vốn trước đây là một thách thức lớn do khoảng cách địa lý và điều kiện cơ sở vật chất hạn chế. Việc triển khai các chương trình học từ xa và học trực tuyến giúp phá vỡ các rào cản này, đặc biệt trong bối cảnh đại dịch COVID-19 vừa qua đã chứng minh tính khả thi và hiệu quả của việc học từ xa.

– *Cá nhân hóa lộ trình học tập của người học*

Chỉ 5.5% người tham gia khảo sát cho rằng EdTech giúp cá nhân hóa lộ trình học tập của người học. Đây là một lĩnh vực mà công nghệ, đặc biệt là AI, có thể mang lại những bước tiến vượt bậc trong tương lai. Cá nhân hóa lộ trình học tập cho phép mỗi người học được tùy chỉnh nội dung và phương pháp học dựa trên nhu cầu, mục tiêu và tiến độ cá nhân của họ. Điều này không chỉ làm tăng hiệu quả học tập mà còn giúp duy trì động lực HTSĐ. Tuy nhiên, việc áp dụng cá nhân hóa vẫn còn hạn chế do các công cụ AI trong giáo dục chưa được triển khai rộng rãi tại Việt Nam.

Khác: có 3.6% người khảo sát đưa ra các ý kiến khác, có thể bao gồm các yếu tố như hỗ trợ tâm lý, phát triển các kỹ năng mềm hoặc việc tạo ra các cộng đồng học tập trực tuyến. Điều này cho thấy rằng EdTech có tiềm năng phát triển thêm các khía cạnh khác của giáo dục ngoài việc tiếp cận tri thức, như phát triển kỹ năng xã hội, kết nối mạng lưới học tập, và thậm chí hỗ trợ về tâm lý, giúp HTSĐ trở nên toàn diện hơn.

3.2.7. Đánh giá mức độ sẵn sàng của HTGD Việt Nam trong việc tích hợp EdTech để thúc đẩy HTSĐ

Bảng 3. Mức độ sẵn sàng của HTGD Việt Nam trong việc tích hợp EdTech để thúc đẩy HTSĐ (N=110)

TT	Mức độ sẵn sàng	Số lượng	Tỉ lệ
1.	Rất sẵn sàng	66	60

2.	Tương đối sẵn sàng	41	37.3
3.	Không ý kiến	57	2.7
4.	Chưa sẵn sàng	0	0

Tổng hợp kết quả khảo sát ở bảng 3 cho thấy:

Mức độ sẵn sàng rất cao: Kết quả bảng 3 cho thấy có 60% người tham gia đánh giá HTGD Việt Nam "rất sẵn sàng" trong việc tích hợp công nghệ để thúc đẩy HTSĐ. Điều này phản ánh nhận thức tích cực và sự chuẩn bị tốt của các CSGD trong việc ứng dụng các công nghệ hiện đại vào giảng dạy và học tập. Các yếu tố như sự phổ biến của thiết bị di động, nền tảng học trực tuyến, và sự phát triển của trí tuệ nhân tạo (AI) đã dần thâm nhập vào HTGD. Điều này cho thấy một sự chuyển biến mạnh mẽ về chính sách và thực tiễn, khi các trường học và cơ quan giáo dục đã bắt đầu thích nghi và khai thác các tiềm năng mà công nghệ mang lại.

Tương đối sẵn sàng: Khoảng 37.3% đánh giá HTGD "tương đối sẵn sàng", cho thấy một phần lớn GV, CBQL vẫn nhìn nhận rằng còn tồn tại những khó khăn nhất định. Các thách thức có thể là:

Thiếu hạ tầng công nghệ đồng bộ: Không phải tất cả các CSGD đều có cùng mức độ đầu tư về cơ sở vật chất và hạ tầng công nghệ. Đặc biệt, các trường học ở vùng sâu, vùng xa vẫn gặp khó khăn về kết nối internet, trang thiết bị kỹ thuật số, dẫn đến khả năng ứng dụng công nghệ hạn chế.

Đào tạo kỹ năng số chưa toàn diện: Việc đào tạo kỹ năng công nghệ cho GV và CBQL còn chưa được đồng đều, làm giảm hiệu quả trong việc triển khai các giải pháp EdTech.

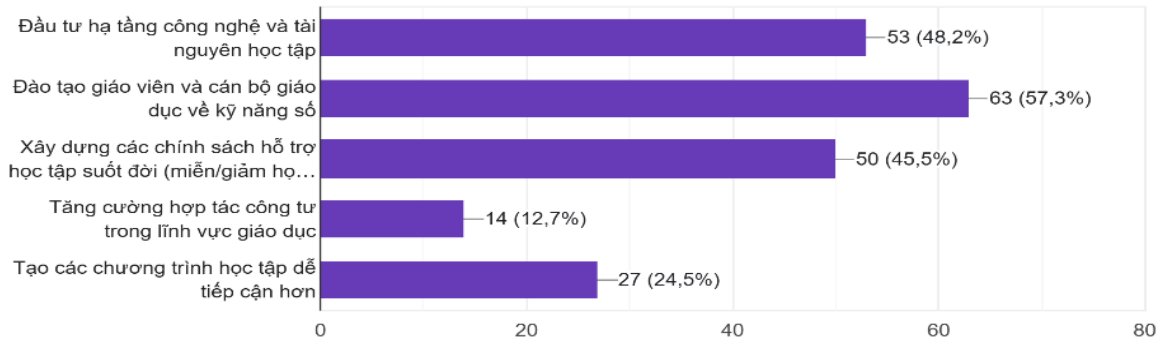
Khả năng tiếp cận tài nguyên giáo dục số chưa đủ mạnh: Mặc dù các nền tảng học trực tuyến đang ngày càng phát triển, nhưng việc thiết kế và cung cấp nội dung học tập phù hợp với nhu cầu học suốt đời của từng cá nhân vẫn chưa thực sự tối ưu hóa.

Không có ý kiến: Có một tỷ lệ nhỏ (2.7%) không đưa ra ý kiến về mức độ sẵn sàng của HTGD. Điều này có thể xuất phát từ việc một số GV, CBQL chưa có đủ thông tin hoặc kinh nghiệm trực tiếp với việc ứng dụng CNGD. Ngoài ra, họ có thể chưa rõ ràng về vai trò cụ thể của công nghệ trong việc thúc đẩy HTSĐ hoặc không nhận thấy rõ những thay đổi gần đây trong HTGD.

Không ai đánh giá chưa sẵn sàng: Điểm tích cực nhất là không có ai đánh giá rằng HTGD "chưa sẵn sàng". Điều này cho thấy hầu hết các GV và CBQL đã công nhận sự tiến bộ của HTGD trong việc áp dụng công nghệ. Tuy nhiên, việc không có đánh giá tiêu cực cũng đồng nghĩa với áp lực lớn hơn cho hệ thống, đòi hỏi các cơ quan giáo dục và trường học phải tiếp tục đầu tư và cải tiến để đáp ứng nhu cầu ngày càng tăng về HTSĐ trong KNS.

Kết quả khảo sát cho thấy HTGD Việt Nam đang ở mức độ sẵn sàng cao trong việc tích hợp công nghệ để thúc đẩy HTSĐ. Để đạt được mục tiêu HTSĐ trong KNS, sự đồng bộ giữa công nghệ, cơ sở hạ tầng và kỹ năng của GV, người học là yếu tố then chốt trong việc nâng cao chất lượng giáo dục toàn diện.

3.2.8. Những điều cần thay đổi trong HTGD Việt Nam để thúc đẩy HTSĐ trong KNS



Biểu đồ 9. Đề xuất thay đổi để thúc đẩy HTSĐ trong KNS (N=110)

Đào tạo GV và cán bộ giáo dục về kỹ năng số: Với 63 người (57.3%) chọn phương án này, có thể thấy đây là nhu cầu cấp bách nhất để thúc đẩy HTSĐ trong KNS. Trong bối cảnh công nghệ ngày càng đóng vai trò quan trọng trong giáo dục, việc trang bị kỹ năng số cho GV, CBQL là yếu tố quan trọng. Khi GV, CBQL làm chủ được công nghệ, họ sẽ dễ

dàng ứng dụng vào giảng dạy và quản lý, từ đó thúc đẩy quá trình học tập liên tục và hiệu quả hơn. Cần triển khai các chương trình đào tạo liên tục, chuyên sâu và thực tiễn để đảm bảo đội ngũ GV luôn được cập nhật các kiến thức và kỹ năng mới nhất, phù hợp với nhu cầu của giáo dục hiện đại như các ý kiến đề xuất cụ thể như "Rèn luyện cho các GV tiếp cận với công nghệ số", "Mở các lớp huấn luyện về công nghệ cho GV thường xuyên, có thể tổ chức tại đơn vị hoặc tập trung", "Tăng cường nhiều hơn các buổi tập huấn công nghệ cho GV, CBQL để kịp thời tiếp cận các công nghệ tiên tiến".

Đầu tư hạ tầng công nghệ và tài nguyên học tập: Có 53 người (48.2%) đề xuất đầu tư vào hạ tầng công nghệ và tài nguyên học tập. Điều này phản ánh sự cần thiết của việc phát triển cơ sở hạ tầng công nghệ để đảm bảo HTSĐ trở nên khả thi và thuận lợi. Các trường học cần được trang bị đầy đủ máy móc, phần mềm, và kết nối internet mạnh mẽ để có thể triển khai các chương trình học trực tuyến hoặc sử dụng EdTech. Bên cạnh đó, việc xây dựng và cung cấp tài nguyên học tập phong phú, dễ tiếp cận (như tài liệu điện tử, khóa học trực tuyến) sẽ tạo điều kiện cho người học ở mọi lứa tuổi tiếp cận kiến thức một cách nhanh chóng và hiệu quả.

Ý kiến phỏng vấn: "Cần đầu tư tốt cơ sở vật chất"; "Tạo điều kiện để tất cả người học được tiếp cận nhiều hơn trong việc ứng dụng công nghệ thông tin"; "Cung cấp cơ hội học tập trong môi trường làm việc đảm bảo đủ cơ sở vật chất về KNS".

Xây dựng các chính sách hỗ trợ HTSĐ (miễn/giảm học phí, học bổng): Với 50 người (45.5%) chọn phương án này, cho thấy chính sách hỗ trợ tài chính đóng vai trò quan trọng trong việc thúc đẩy HTSĐ. Rào cản tài chính vẫn là một vấn đề lớn đối với nhiều người, đặc biệt là những người có thu nhập thấp hoặc đang sống ở các khu vực có điều kiện kinh tế khó khăn. Các chính sách miễn giảm học phí, học bổng hoặc hỗ trợ tài chính sẽ giúp khuyến khích mọi người tham gia vào các khóa học nâng cao kiến thức và kỹ năng mà không bị gánh nặng tài chính cản trở. Điều này có ý nghĩa đặc biệt trong KNS, khi HTSĐ không còn là lựa chọn mà trở thành một nhu cầu cần thiết để theo kịp sự phát triển của công nghệ và thị trường lao động. GV, CBQL có đề xuất cụ thể: "Nên tạo điều kiện học miễn phí, hướng dẫn cụ thể, rõ ràng theo quy trình để tất cả mọi người đều có thể tiếp cận học dễ dàng", "Tạo cơ hội, kinh phí và nguồn tư liệu học tập để mọi người có thể học tập", "Nâng cao yêu cầu trong công việc gắn với quyền lợi kinh tế."

Tạo các chương trình học tập dễ tiếp cận hơn: Có 27 người (24.5%) đề xuất xây dựng các chương trình học tập dễ tiếp cận hơn, đây là một hướng đi cần thiết để đảm bảo HTSĐ cho mọi đối tượng. Các chương trình học cần được thiết kế sao cho linh hoạt, đa dạng, phù hợp với mọi lứa tuổi, trình độ và hoàn cảnh như cung cấp các khóa học ngắn hạn, trực tuyến, hoặc tự học có thể giúp người học chủ động trong việc chọn lựa và tham gia mà không bị ràng buộc bởi lịch trình cố định. Sự dễ tiếp cận cũng bao gồm việc giảm bớt các rào cản ngôn ngữ và phát triển các công cụ hỗ trợ học tập cho người khuyết tật hoặc những nhóm yếu thế khác. Một số đề xuất cụ thể: "Cho sự linh hoạt về thời gian học"; "Tạo ra các nhóm, diễn đàn hoặc mạng lưới trực tuyến để người học có thể chia sẻ kiến thức, kinh nghiệm và tài nguyên học tập", "Cần thêm các chuyên đề để áp dụng vào thực tiễn."

Tăng cường hợp tác công tư trong lĩnh vực giáo dục: Chỉ có 14 người (12.7%) chọn phương án này, tuy nhiên, đây cũng là một hướng đi quan trọng để thúc đẩy HTSĐ. Hợp tác công tư có thể mang lại nhiều lợi ích như huy động nguồn lực tài chính, phát triển các chương trình học tập phù hợp với thị trường lao động, và nâng cao chất lượng giáo dục. Doanh nghiệp có thể cung cấp các chương trình đào tạo, tài trợ học bổng, hoặc hợp tác với các CSGD để phát triển nội dung học tập đáp ứng nhu cầu thực tế. Điều này sẽ giúp người học tiếp cận kiến thức và kỹ năng cần thiết cho công việc hiện tại và tương lai. Ý kiến cụ thể: "Xã hội hóa chương trình và nội dung giáo dục số nền tảng", "Tổ chức các diễn đàn trực tuyến để người học chia sẻ kiến thức và kinh nghiệm"…

Như vậy, dựa trên kết quả khảo sát, có thể thấy rằng HTGD Việt Nam cần tập trung vào một số thay đổi quan trọng để thúc đẩy HTSĐ trong KNS:

Đào tạo kỹ năng số cho GV và CBQL giáo dục là ưu tiên hàng đầu, vì họ chính là người hướng dẫn và đồng hành với người học trong suốt quá trình học tập. Cần tổ chức các khóa huấn luyện, cập nhật công nghệ mới thường xuyên để nâng cao năng lực số.

Đầu tư vào hạ tầng công nghệ là điều kiện cần thiết để các chương trình học trực tuyến, học từ xa có thể được triển khai hiệu quả và toàn diện.

Hỗ trợ tài chính qua các chính sách miễn, giảm học phí hoặc học bổng sẽ tạo động lực mạnh mẽ để khuyến khích mọi người tham gia vào HTSĐ.

Phát triển các chương trình học linh hoạt và dễ tiếp cận cho mọi đối tượng, giúp mở rộng phạm vi giáo dục tới các khu vực khó khăn và những người học có điều kiện hạn chế.

Tăng cường hợp tác công tư để huy động nguồn lực xã hội và nâng cao tính thực tiễn của các chương trình học tập.

Đây là những bước quan trọng để HTGD Việt Nam có thể thích ứng và phát triển trong bối cảnh KNS, thúc đẩy HTSĐ trở thành một thực tế phổ biến và bền vững.

3.2.9. Ý kiến đề xuất để thúc đẩy HTSĐ trong KNS của những người tham gia khảo sát

Tổng hợp và phân loại 27 ý kiến đề xuất của những người tham gia khảo sát để xuất những giải pháp nhằm thúc đẩy HTSĐ trong KNS tập trung vào 6 vấn đề như sau:

Nâng cao năng lực và đào tạo đội ngũ GV

Để thúc đẩy HTSĐ trong KNS, cần chú trọng vào việc nâng cao năng lực cho GV, CBQL. Các biện pháp bao gồm tổ chức thường xuyên các lớp huấn luyện công nghệ, có thể tại đơn vị hoặc tập trung, nhằm giúp tiếp cận và làm chủ công nghệ số. Ngoài ra, cần đẩy mạnh các buổi tập huấn để họ kịp thời thích ứng với những đổi mới trong giáo dục. Bên cạnh đó, cần đào tạo chuyên sâu về kỹ năng số phù hợp với từng chuyên ngành và tạo điều kiện để họ được học tập, tham khảo tài liệu nâng cao năng lực.

Cải thiện cơ sở vật chất và nguồn tài nguyên

Đầu tư vào cơ sở vật chất và nguồn tài nguyên học tập là điều kiện tiên quyết để thúc đẩy HTSĐ. Cần đảm bảo môi trường làm việc và học tập được trang bị đầy đủ cơ sở vật chất hiện đại, hỗ trợ hiệu quả việc ứng dụng công nghệ số. Đồng thời, việc bổ sung và nâng cao chất lượng giảng dạy của đội ngũ giảng viên nên đi kèm với đầu tư thiết bị, hạ tầng nhằm phục vụ mục tiêu đào tạo toàn diện và chất lượng cao.

Ứng dụng công nghệ và cá nhân hóa việc học

Cần tận dụng công nghệ, đặc biệt là trí tuệ nhân tạo (AI), để cá nhân hóa quá trình học tập. AI có thể phân tích nhu cầu, sở thích và mục tiêu của từng người học để gợi ý nội dung học tập phù hợp như video, bài viết, khóa học, hoặc bài tập thực hành. Ngoài ra, cần trang bị cho người học các kỹ năng khai thác công nghệ và phát triển năng lực số, giúp họ dễ dàng tiếp cận các công cụ và nền tảng học tập trong môi trường số hiện đại.

Tổ chức các hình thức học tập linh hoạt và cộng đồng

Khuyến khích các hình thức học tập linh hoạt và cộng đồng là một giải pháp quan trọng. Các diễn đàn trực tuyến hoặc mạng lưới học tập giúp người học chia sẻ kiến thức, kinh nghiệm, và tài nguyên. Đồng thời, cần xã hội hóa chương trình giáo dục số, tạo điều kiện để tất cả mọi người được tiếp cận học tập miễn phí với hướng dẫn rõ ràng, cụ thể. Việc cho phép linh hoạt về thời gian học tập cũng giúp người học chủ động hơn trong việc nâng cao trình độ.

Động lực và điều kiện hỗ trợ học tập

Để tạo động lực HTSĐ, cần thiết lập các cơ chế hỗ trợ về kinh phí, nguồn tài liệu, và thời gian học tập. Các cá nhân cần nhận thấy rõ lợi ích của học tập thông qua việc gắn kết yêu cầu nâng cao trình độ với các quyền lợi kinh tế, như tăng thu nhập hay cơ hội thăng tiến. Bên cạnh đó, cần đảm bảo môi trường học tập có đủ điều kiện thuận lợi để thúc đẩy mọi người tham gia học tập một cách bền vững.

Nội dung học tập phù hợp và thực tiễn

Nội dung học tập cần được thiết kế phù hợp với từng giai đoạn phát triển và có tính ứng dụng cao. Cần bắt đầu từ những bài học cơ bản ở cấp tiểu học để tạo nền tảng. Đồng thời, tăng cường các chuyên đề thực tiễn và giảm lý thuyết hàn lâm, tập trung vào thực hành, trải nghiệm. Việc này không chỉ giảm thời gian và chi phí mà còn giúp người học dễ dàng tiếp cận công nghệ và thích nghi với các hình thức giáo dục hiện đại.

4. KẾT LUẬN

– HTSĐ trong KNS là yếu tố then chốt: HTSĐ đóng vai trò quan trọng trong việc giúp cá nhân và xã hội thích ứng với những thay đổi nhanh chóng của công nghệ và thị trường lao động. Đây là nhu cầu tất yếu để nâng cao năng lực cạnh tranh trong thời kỳ cách mạng công nghiệp 4.0.

– Mô hình từ các quốc gia tiên tiến mang lại bài học giá trị Phần Lan, Hàn Quốc, và Singapore đã triển khai thành công các mô hình HTSĐ nhờ tích hợp công nghệ và chiến lược phù hợp. Các quốc gia này chú trọng giáo dục linh hoạt, đào

tạo kỹ năng số và cá nhân hóa lộ trình học, cung cấp kinh nghiệm quý báu cho Việt Nam trong việc xây dựng HTGD hiện đại.

– Công nghệ là động lực thúc đẩy HTSĐ. Công nghệ hiện đại tạo điều kiện tiếp cận tri thức dễ dàng hơn và cải thiện chất lượng học tập. Các nền tảng trực tuyến, AI và ứng dụng di động không chỉ tăng tính linh hoạt mà còn kết nối người học với cộng đồng toàn cầu.

– Đào tạo GV và đầu tư hạ tầng là ưu tiên hàng đầu. Việc nâng cao kỹ năng số cho GV và CBQL là nền tảng để thúc đẩy HTSĐ. Đồng thời, đầu tư vào hạ tầng công nghệ và tài nguyên học tập sẽ hỗ trợ hiệu quả việc triển khai các chương trình học tập số.

– Cần chính sách và sự hợp tác toàn diện. Hỗ trợ tài chính và chính sách học tập linh hoạt là động lực khuyến khích người dân tham gia học tập. Hợp tác giữa chính phủ, doanh nghiệp và các tổ chức xã hội sẽ giúp huy động nguồn lực và đảm bảo phát triển giáo dục bền vững trong KNS.

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TATEMAE (建前 - MẶT NGOÀI) VÀ HONNE (本音 - MẶT THẬT): THỰC TRẠNG VÀ THÁCH THỨC THÍCH NGHI VĂN HÓA CỦA THỰC TẬP SINH VIỆT NAM TRONG NGÀNH NHÀ HÀNG – KHÁCH SẠN TẠI NHẬT BẢN

Võ Văn Thành Thân[1*]

[1]Khoa Ngôn ngữ và Văn hóa Quốc tế, Trường Đại học Kinh tế - Tài chính Thành phố Hồ Chí Minh

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1. TỔNG QUAN

Trung tâm Phát triển Nguồn nhân lực Việt – Nhật (VJDC), trực thuộc Trường Đại học Kinh tế – Tài chính TP. Hồ Chí Minh (UEF), được thành lập vào ngày 27/9/2024 như một mô hình hợp tác giáo dục – nghề nghiệp nhằm đáp ứng nhu cầu hội nhập quốc tế và phát triển nguồn nhân lực chất lượng cao giữa Việt Nam và Nhật Bản. VJDC đưa các SV ngành Ngôn ngữ Nhật nói riêng và các ngành khác của trường UEF nói chung sang Nhật Bản thực tập. Các vị trí thực tập đa số trong ngành Dịch vụ nhà hàng – khác sạn nổi tiếng như: Don Nantoya (South Food – Tokyo): Nhà hàng kiểu Nhật truyền thống, Chura Shima (Okinawa): Nhà hàng ẩm thực đảo, Restaurant Hommage (Asakusa – Tokyo): Nhà hàng cao cấp phong cách Pháp, Robatayaki Restaurant (Hokkaido): Nhà hàng nướng truyền thống kiểu Nhật, Sounkyo Kanko Hotel, Kougakuro, Tsurunoyu Onsen: Các khách sạn nghỉ dưỡng tại Hokkaido, Niigata, Akita,...

Trước khi VJDC ra đời, tiền thân là Khoa Ngôn ngữ và Văn hóa quốc tế. Từ năm học 2022–2023 về trước, khoa đã tổ chức thành công các chương trình thực tập thực tế (TTTT) cho khoảng 100 SV. Con số này tăng lên 80 SV chỉ trong năm học 2023–2024 và 2024 – 2025 dự kiến không thấp hơn số SV trong năm học trước. Cho đến nay, 100% SV đều đi thông qua chương trình hợp tác. Trong đó: 70% SV đi 12 tháng, 10% SV đi 4 tháng, 10% SV đi 6 tháng, 5% SV đi 8 tháng, 5% SV đi 10 tháng.

Sau khi điều hành được nhiều nhóm thực tập, chúng tôi nhận thấy có rất nhiều vấn đề thích nghi của SV, đặc biệt trong 3 tháng đầu. Ban đầu, chúng tôi thực hiện khảo sát khả năng thích nghi của SV thông qua lý thuyết thích nghi văn hóa của Kim (2001, sẽ được đề cập ở mục dưới). Tuy nhiên sau khi tiến hành nghiên cứu, chúng tôi phát hiện hơn 80% SV gặp vấn đề trong hiểu ý hội thoại. Nhiều SV bày tỏ không chịu nỗi áp lực, thậm chí có 5% SV quay trở về nước, 20% SV bày tỏ nguyện vọng trở về nước dù đã sử dụng nhiều biện pháp hỗ trợ. Trong lúc thực hiện nghiên cứu phỏng vấn sâu bán cấu trúc, các vấn đề thích nghi giao tiếp thường xuyên được đề cập đến như: không biết lời nói lịch sự có thật hay không; dễ dùng sai sonkeigo/kenjougo; không quen với phong cách "rất nghiêm túc" của người Nhật; không thể chia sẻ cảm xúc thật; cảm thấy bị cô lập; phải luôn mỉm cười kể cả khi mệt hoặc không thích; không quen với văn hóa "đồng thuận nhóm"; trang phục bị kì thị; không được nghỉ đúng giờ, làm thêm vì "tinh thần tập thể" mà không có tiền tăng ca; rào cản ngôn ngữ; không hiểu ý ngầm của mọi người xung quanh; người Nhật không chỉ thẳng, không "cầm tay chỉ việc",… Khi thực hiện nghiên cứu thích nghi của TTS UEF tại Nhật, rào cản ngôn ngữ là một cản trở; tuy nhiên hiểu ý người Nhật lại là một vấn đề phức tạp hơn. Chính vì lý do đó, chúng tôi thực hiện đề tài này nhằm khám phá các yếu tố ảnh hưởng đến việc thích nghi của SV Việt Nam TTTT trong nhóm ngành nhà hàng – khách sạn tại Nhật Bản.

Vấn đề sốc văn hóa Nhật không phải là chuyện xa lạ. Đã có rất nhiều nghiên cứu nhắc đến vấn đề này. Cụ thể 2016, nghiên cứu "Situated Learning of International Students through Internship in Japan" của Naomi Tsunematsu trình bày góc nhìn phản tư của tác giả như một nhà nhân học và giảng viên phụ trách thực tập cho sinh viên quốc tế tại Nhật Bản. Nghiên cứu đã khám phá thách thức văn hóa – xã hội trong quá trình thực tập của sinh viên quốc tế tại Nhật Bản, đặc biệt liên quan đến khái niệm uchi/soto (trong/ngoài) và mối quan hệ quyền lực. Qua đó, nghiên cứu đề xuất mô hình học tập trải nghiệm định vị (situated learning) – mô hình giúp sinh viên ứng dụng kiến thức lý thuyết trong bối cảnh thực tế tại cộng đồng địa phương Nhật Bản. Nghiên cứu quan sát SV đến từ các ngành: Ngôn ngữ và Văn học Nhật Bản, Nhân học, Lịch sử, Kinh doanh, Công nghệ thông tin, Châu Á học, Quan hệ quốc tế. Các thực tập sinh đến Nhật Bản làm các công việc: khảo sát thị trường quốc tế cho doanh nghiệp địa phương, làm hướng dẫn viên du lịch bằng tiếng Anh, tổ chức và thực hiện các giao lưu quốc tế tại địa phương, sản xuất phim ngắn. Nghiên cứu đưa ra các phát hiện chính: Thứ nhất, khái niệm uchi/soto ảnh hưởng sâu sắc đến mối quan hệ trong thực tập: Giảng viên và sinh viên được xem là một nhóm nội

bộ (uchi), trong khi cộng đồng địa phương là bên ngoài (soto) xác định khoảng cách xã hội, quyền lực và hành vi ứng xử trong bối cảnh Nhật Bản. Thứ hai, vai trò của giảng viên như người điều phối và người bảo trợ (amae): Giảng viên không chỉ hướng dẫn học thuật mà còn xây dựng mối quan hệ tin cậy với cộng đồng địa phương, người bản sứ để SV được chấp nhận. Sinh viên được đặt trong vị trí "amae" – được mong đợi nhận sự chăm sóc và bảo vệ từ người lớn tuổi hơn. Thứ ba, tác giả đề xuất chuyển đổi mô hình thực tập sang "dẫn dắt SV" (student-intiative) chuyển hướng từ mô hình "thụ động" sang mô hình sinh viên chủ động đề xuất và thực hiện dự án. Thứ tư, Thực tập là quá trình học tập trải nghiệm đòi hỏi năng lực đa chiều thông qua sự tham gia ngoại vi hợp pháp (legitimate peripheral participation) – một khái niệm của Lave & Wenger (1991). Thứ năm, Khó khăn trong việc định vị thực tập như một hoạt động học thuật trong đại học Nhật, văn hóa học thuật Nhật Bản không khuyến khích giảng viên đảm nhiệm vai trò trung gian đại diện sinh viên với bên ngoài (Naomi Tsunematsu, 2016).

Năm 2019, Jakeline Lagones trong "Academic and Daily Life Satisfaction of Monbukagakusho Scholarship Students in Japan: The Case of Peruvian International Students" Phân tích các yếu tố ảnh hưởng đến sự hài lòng trong học thuật (academic satisfaction) và cuộc sống thường nhật (daily life satisfaction) của sinh viên Peru nhận học bổng chính phủ Nhật (Monbukagakusho) đang học tập tại Nhật Bản bằng phương pháp phỏng vấn sâu 5 SV và 20 cựu SV đã du học Nhật Bản. Kết quả như sau: (1) Ngôn ngữ là rào cản lớn nhất; (2) Hiểu và chấp nhận văn hóa Nhật là yếu tố hài lòng then chốt; (3) SV cần hỗ trợ học thuật lẫn đời sống; (4) những nguyên tắc Tatemae – Honne, Sempai – Kohai, Aisowarai có ảnh hưởng thực chất đến trải nghiệm sống và học của du học sinh (Jakeline Lagones, 2019).

Năm 2020, "Culture Shocks at Japanese Workplace of Indonesian Student Taking Internship Program in Japan" của P. Haryanti khám phá những khía cạnh của cú sốc văn hóa (culture shock) mà sinh viên Indonesia gặp phải khi tham gia chương trình thực tập tại Nhật Bản, đặc biệt là tại nơi làm việc. Tác giả đã dùng phương pháp định tính kết hợp tiếp cận nhân văn hóa thông qua thu thập dữ liệu từ 12 sinh viên thực tập thông qua bảng hỏi và phỏng vấn bán cấu trúc qua mạng xã hội (WhatsApp, Facebook, Messenger). Đồng thời, nghiên cứu cũng phân tích các trải nghiệm thực tế tại nơi làm việc, liên hệ với các mô hình sốc văn hóa (Recuperation, Learning, Journey, Equilibrium). Ngoài ra, các SV Indonesia sang Nhật thực tập ở các vị trí: phục vụ nhà hàng, Bartender, phục vụ sân gofl, lễ tân, làm việc văn phòng, tham gia mở nhà hàng. Kết quả nghiên cứu như sau: (1) SV bối rối với việc sử dụng kính ngữ (sonkeigo, kenjougo), từ chuyên môn trong ngành dịch vụ, và kanji phức tạp (ví dụ tên món ăn, đồ uống); (2) Nhiều sinh viên không hiểu được thông điệp ngầm (Tatemae) và bị sốc khi bị nói xấu sau lưng hoặc đối mặt với sự lạnh nhạt; (3) Một số sinh viên bị phân biệt chủng tộc nhẹ (microaggressions), nhận xét về cách ăn mặc, tín ngưỡng, hoặc đơn giản là bị cô lập; (4) Có nhiều sự hiểu lầm trong trang phục; (5) SV không quên với chuẩn mực: rời chỗ làm việc sau cấp trên, luôn cười dù mệt mỏi, áp lực cao, thời tiết khó chịu,…; (6) Nhiều sinh viên cảm thấy mất mát văn hóa do không có không gian tôn giáo như ở Indonesia (Haryanti, 2020).

Các nghiên cứu trên thực hiện rất sát với đề tài của chúng tôi, tuy nhiên nghiên cứu của Naomi Tsunematsu dùng phương pháp phản tư học, mô tả tình huống, hoàn toàn dựa vào trải nghiệm chủ quan và kinh nghiệm cá nhân trong 13 năm điều hành chương trình sẽ dễ dẫn đến thiếu tính đại diện và khái quát hóa; mang tính chủ quan, thiên kiến cá nhân; thiếu tính kiểm chứng độc lập từ người khác. Ngoài ra, chưa có nghiên cứu nào tập trung riêng vào thực tập sinh Việt Nam trong ngành nhà hàng – khách sạn tại Nhật Bản; thiếu nghiên cứu khai thác vai trò của Tatemae – Honne trong giao tiếp nghề nghiệp hàng ngày; thiếu nghiên cứu phản tư (reflexive study) từ góc nhìn của người vừa điều phối, vừa tương tác liên tục với SV và doanh nghiệp Nhật; thiếu phân tích giao thoa giữa lý thuyết văn hóa Nhật và trải nghiệm cá nhân hóa của SV ngành dịch vụ – một đặc thù cực kỳ nhạy cảm về ứng xử và ngôn ngữ. Đó là khoảng trống cũng như điểm mới cho đề tài nghiên cứu của chúng tôi.

Đề tài nhằm làm rõ thực trạng và thách thức trong quá trình thích nghi văn hóa của thực tập sinh Việt Nam tại Nhật Bản trong lĩnh vực nhà hàng – khách sạn, với trọng tâm là phân tích sự ảnh hưởng của khái niệm Tatemae (mặt ngoài) và Honne (mặt thật) trong môi trường giao tiếp và làm việc. Phương pháp nghiên cứu sử dụng là phân tích phản tư (reflexive analysis) kết hợp phỏng vấn sâu (in-depth interviews) 10 SV đang TTTT tại Nhật thông qua mạng xã hội (Mesenger,…). Tác giả – với vai trò là người có trên 15 năm kinh nghiệm kết nối ngoại giao giáo dục với Nhật và hơn 5 năm trực tiếp điều phối chương trình thực tập quốc tế cho sinh viên UEF – đóng vai trò vừa là người quan sát, vừa là đối tượng phản tư, khai thác từ chính kinh nghiệm thực tiễn khi đồng hành cùng sinh viên tại Nhật. Phương tiện nghiên cứu bao gồm: (1) Ghi chép hiện trường và nhật ký điều phối các kỳ thực tập; (2) Phỏng vấn sâu 10 thực tập sinh Việt Nam đang thực tập

tại Nhật; (3) Phân tích tài liệu nội bộ (quy trình tuyển chọn, đào tạo, hỗ trợ sinh viên từ phía UEF và đối tác Nhật).

Kết quả nghiên cứu cho thấy: (1) sự khác biệt giữa Tatemae và Honne là một rào cản lớn trong giao tiếp khiến sinh viên dễ hiểu nhầm thông điệp và cảm thấy khó nắm bắt mong đợi của cấp trên người Nhật; (2) thực tập sinh thường xuyên rơi vào trạng thái "không biết nên nói thật hay giữ phép lịch sự", từ đó hình thành tâm lý phòng thủ hoặc cam chịu; (3) quá trình thích nghi diễn ra hiệu quả hơn khi có sự chuẩn bị văn hóa trước xuất cảnh. Do đó, chúng tôi đề xuất mô hình thích nghi văn hóa giao tiếp phù hợp với giao tiếp mẹ đẻ của SV VN tại Nhật Bản.

2. MÔ HÌNH LÝ THUYẾT – PHƯƠNG PHÁP NGHIÊN CỨU

2.1. Cơ sở lý thuyết

2.1.1. Khái niệm Taemae – Honne

Yamamoto & Lloyd, 2019 định nghĩa *"honne và tatemae"* hay *"本音と建て前"* – thể hiện tính hai mặt giữa những gì người Nhật thực sự nghĩ (*honne*) và cách họ cư xử trước công chúng để phù hợp với kỳ vọng xã hội (*tatemae*) (Yamamoto & Lloyd, 2019). Việc không hiểu rõ những đặc trưng giao tiếp độc đáo này trong môi trường kinh doanh Nhật có thể dẫn đến hậu quả nghiêm trọng, thậm chí ngăn cản cuộc trò chuyện từ ban đầu. Ngoài Yamamoto & Lloyd, đã có rất nhiều tình huống và ý nghĩa về honne và tatemae được chúng tôi thống kê một vài trường hợp điển hình thành bảng sau:

Bảng 1. Sơ lược tình huống và ý nghĩa honne - tatemae từ một số nghiên cứu

Trường hợp xảy ra	Định nghĩa/ý nghĩa
Giảng viên Mỹ nhận email "cảm ơn" từ đối tác Nhật nhưng không nhận được hợp tác như mong đợi (Miller, C., Noyori-Corbett, C., Tani, S., Sawano, M., & Dou, X., 2024)	Tatemae biểu hiện qua lời nói lịch sự, cảm ơn và đồng ý, nhưng Honne lại là từ chối nhẹ nhàng; nếu không hiểu sẽ gây ngộ nhận kết quả thực tế.
Sinh viên Peru được giáo sư Nhật mời ăn tối, nhưng không được hỏi ý kiến nghiên cứu cá nhân (Lagones, J., 2019)	Tatemae tạo không khí "hòa đồng", nhưng Honne vẫn giữ khoảng cách quyền lực; lời mời mang tính hình thức chứ không đồng nghĩa với thân thiết, chỉ dẫn học thuật.
Thực tập sinh Indonesia lo lắng khi không được góp ý trực tiếp từ người quản lý Nhật, hỏi quản lý nhưng quản lý không trả lời (Haryanti, P., 2020)	Sự im lặng lịch sự (Tatemae) được hiểu là đồng tình, nhưng thực chất người Nhật đang thể hiện sự không hài lòng (Honne) mà không muốn đối đầu.

(Nguồn: Tác giả tổng hợp)

Nhìn chung các nghiên cứu của Yamamoto, K., & Lloyd, R. (2019) và Miller, C. et al. (2024) đều hiểu Tatemae là cách hành xử, lời nói, và thái độ bên ngoài mà một người thể hiện để phù hợp với chuẩn mực xã hội, vai trò, và sự kỳ vọng từ người khác. Đây được xem là một chiến lược ứng xử để duy trì sự hài hòa trong các mối quan hệ xã hội. Trong khi đó, Honne là những suy nghĩ, cảm xúc, mong muốn hoặc ý kiến thật sự của một người – thường được giữ kín và chỉ chia sẻ trong những mối quan hệ thân thiết hoặc hoàn cảnh an toàn về mặt cảm xúc. Đây là phần "bên trong", phản ánh con người thật. Honne có thể khác hoặc mâu thuẫn với những gì người đó nói ra (Tatemae) trước công chúng. Trong văn hóa Nhật, việc thể hiện Honne một cách trực tiếp trước đám đông có thể bị xem là thiếu tinh tế, gây mâu thuẫn hoặc phá vỡ hòa khí (Yamamoto, K., & Lloyd, R., 2019 và Miller, C. et al., 2024).

Khi phỏng vấn về việc thích nghi với TTS của UEF ở Nhật, đa số các TTS đều làm việc trong môi trường dịch vụ - nhà hàng – khách sạn; chúng tôi nhận thấy hầu hết các vấn đề đều có liên quan đến giao tiếp. Ngoài rào cản ngôn ngữ là yếu tố gây cản trở, việc hiểu ý còn quan trọng hơn cả việc nghe được người Nhật nói. Vì vậy, hai khái niệm này đặc biệt quan trọng trong ngành nhà hàng – khách sạn tại Nhật Bản – một đất nước vốn dĩ nổi tiếng trong ngành du lịch trên thế giới. Mặt khác, đây là ngành gắn liền với giao tiếp khách hàng ở mức độ cao, chịu nhiều áp lực về lễ nghi, lịch sự và tinh tế. Đồng thời cũng chịu nhiều ảnh hưởng sâu sắc từ chuẩn mực ứng xử văn hóa Nhật Bản. Nói rõ hơn, Tatemae được sử dụng như một "mặt nạ lịch sự", nhân viên luôn giữ nụ cười, lời nói nhẹ nhàng, thể hiện sự khiêm nhường tuyệt đối dù trong nội tâm có thể mệt mỏi, bức xúc ra sao. Việc không duy trì Tatemae đúng cách bị xem là thiếu chuyên nghiệp và xúc phạm người đối diện. Honne lại là phần "ẩn", nếu không được bày tỏ đúng cách, TTS dễ bị hiểu nhầm, căng thẳng tâm lý, hoặc không nhận được sự hỗ trợ kịp thời dẫn đến bỏ ý định thực tập. Nhiều SV được cho là có triệu chứng rối

loạn lo âu, trầm cảm nhẹ khi không dám góp ý về lịch làm việc bất công hoặc sợ mất lòng dẫn đến tâm lý luôn ở trong tình trạng căng thẳng. Một số khác lại hiểu nhầm Tatemae – Honne gây nên hậu quả nghiêm trọng. Trường hợp điển hình chúng tôi ghi nhận được như việc SV bị quản lý Nhật gợi ý "việc này có thể hơi khó nhỉ?", TTS hiểu nhầm đó là đồng ý, nếu khó mà vẫn làm được thì mới giỏi. Nhưng trên thực tế đó là lời từ chối, TTS hiểu nhầm ý nên thực hiện dẫn đến bị đánh giá không tốt. Tâm lý chung của TTS là "sao cố gắng đến kiệt sức vẫn không thể làm hài lòng quản lý Nhật" (một NV phỏng vấn chia sẻ).

Nhìn chung, trong ngành nhà hàng – khách sạn tại Nhật Bản, Tatemae và Honne không chỉ là khái niệm văn hóa, mà là "kỹ năng sống còn" quyết định khả năng thích nghi, giao tiếp, duy trì mối quan hệ, hòa nhập của TTS UEF tại Nhật Bản.

2.1.2. Lý thuyết giao tiếp liên văn hóa

Lý thuyết giao tiếp liên văn hóa ra đời 1950 tại Mỹ do nhà nghiên cứu Edward T. Hall đề xuất. Trong quyển *Beyond Culture* (1976), Edward T. Hall đề cập đến lý thuyết liên văn hóa ở ngữ cảnh thấp (Low-context communication) và lý thuyết liên văn hóa ở ngữ cảnh cao (High-context communication). Trong đó Hall phân biệt các nền văn hóa dựa vào bối cảnh trong giao tiếp. Liên văn hóa ở ngữ cảnh thấp được Hall đề cập với các nền văn hóa ưa chuộng giao tiếp trực tiếp, rõ ràng, minh bạch thông qua lời nói như Mỹ, Đức. Văn hóa ở ngữ cảnh cao được Hall đề cập đến những nền văn hóa thường chứa thông điệp ẩn trong ngụ ý, cử chỉ, sắc thái và ngầm hiểu. Lời nói chỉ là phần nhỏ trong thông tin truyền đạt, người nghe phải đoán được ý nghĩa thực sự trong lời nói đó. Nhật Bản được Hall sắp xếp vào liên văn hóa ở ngữ cảnh cao (Edward T.Hall, 1976).

Sau Hall, cùng bàn về lý thuyết giao tiếp liên văn hóa, nhiều học giả đã có những đóng góp nhất định. Hofstede, G. (2001) đã đề xuất mô hình 6 chiều văn hóa ảnh hưởng đến giao tiếp. Mô hình của Hofstede giúp phát triển các chiều văn hóa quốc gia, giải thích hành vi tổ chức và giao tiếp giữa các nền văn hóa (Hofstede, 2001). Stella Ting-Toomey đã phát triển Lý thuyết quản trị xung đột mặt mũi (Face Negotiation Theory) ứng dụng trong văn hóa châu Á từ năm 1988 đến nay (Stella Ting – Toomey, 1999). Gudykunst & Kim đã phát triển mô hình giao tiếp thích nghi xuyên văn hóa (intercultural adaptation) từ năm 1984 – 2003 (Gudykunst & Kim, 2003)

Nghiên cứu này sẽ sử dụng lý thuyết Hall để tìm hiểu thực trạng thích nghi thông qua giao tiếp của TTS UEF tại Nhật Bản. Dựa vào lý thuyết Hall kết hợp Tatemae – Honne, đề tài thống kê các tình huống giao tiếp, giải thích đặc trưng high-context trong giao tiếp Nhật. Đồng thời, đề tài áp dụng vào phân tích kết quả phỏng vấn, góp phần lý giải việc khó thích khi trong chiều kích giao tiếp với người Nhật.

2.1.2. Lý thuyết thích nghi văn hóa

Có rất nhiều lý thuyết về thích nghi văn hóa, nhưng trong nghiên cứu này, chúng tôi sử dụng lý thuyết thích nghi văn hóa của Young Yun Kim. Trong cuốn sách Becoming Intercultural: An Integrative Theory of Communication and Cross-Cultural Adaptation (2001), Young Yun Kim đề xuất một mô hình động về sự thích nghi liên văn hóa, mô tả quá trình người nhập cư, du học sinh, thực tập sinh,... thích nghi với môi trường văn hóa mới. Thích nghi văn hóa được tác giả định nghĩa: "Thích nghi văn hóa là một quá trình năng động, trong đó các cá nhân di chuyển từ một nền văn hóa này sang một nền văn hóa khác sẽ trải qua sự chuyển hóa nội tại, nhằm đạt được mức độ phù hợp chức năng và sức khỏe tâm lý cao hơn trong môi trường văn hóa mới" (Kim, 2001, p.31). Mô hình thích nghi văn hóa được đề xuất gồm 5 yếu tố như sau: Thứ nhất, năng lực giao tiếp cá nhân bao gồm: kỹ năng ngôn ngữ, khả năng diễn đạt, tiếp nhận và xử lý thông tin. Thứ hai, khả năng giao tiếp với người bản xứ là mức độ xã hội tiếp nhận, sự mở lòng, hỗ trợ và tạo điều kiện hòa nhập. Thứ ba, đặc điểm bẩm sinh và tích lũy sẵn có của người nhập cư, ảnh hưởng đến tốc độ và khả năng thích nghi. Thứ tư, giao tiếp xã hội. Thứ năm, môi trường xã hội bao gồm: chính sách, cộng đồng người đồng hương, đa dạng văn hóa của khu vực sống. Thứ sáu, biến đổi liên văn hóa bao gồm: tư duy, cảm xúc, hành vi (Kim, 2001).

Thích nghi văn hóa là một mô hình thích nghi ghi lại quá trình luôn vận động, luôn diễn ra giữa các yếu tố cá nhân và môi trường xung quanh. Các yếu tố trên sẽ tương tác qua lại, góp phần tạo nên kết quả cuối cùng là khả năng sống độc lập, hiệu quả và hài hòa trong môi trường khác biệt văn hóa.

2.2. Phương pháp nghiên cứu

Nghiên cứu sử dụng phương pháp nghiên cứu định tính, phân tích phản tư từ tác giả kết hợp phỏng vấn sâu bán cấu

trúc với 10 thực tập sinh UEF đang tham gia thực tập trong các ngành nhà hàng – khách sạn tại Nhật. Đối tượng là SV UEF năm 3 – 4, nam và nữ, có kinh nghiệm ít nhất 3 tháng làm việc trực tiếp với người Nhật.

Phỏng vấn bán cấu trúc xoay quanh các khó khăn trong thích nghi, đặc biệt là giao tiếp thông qua mạng xã hội. Kết hợp với ghi chép, ghi chú hiện trường, nhật ký cá nhân điều phối thực tập từ chính tác giả là người có kinh nghiệm hơn 5 năm trong thiết kế và thực thi chương trình thực tập thực tế.

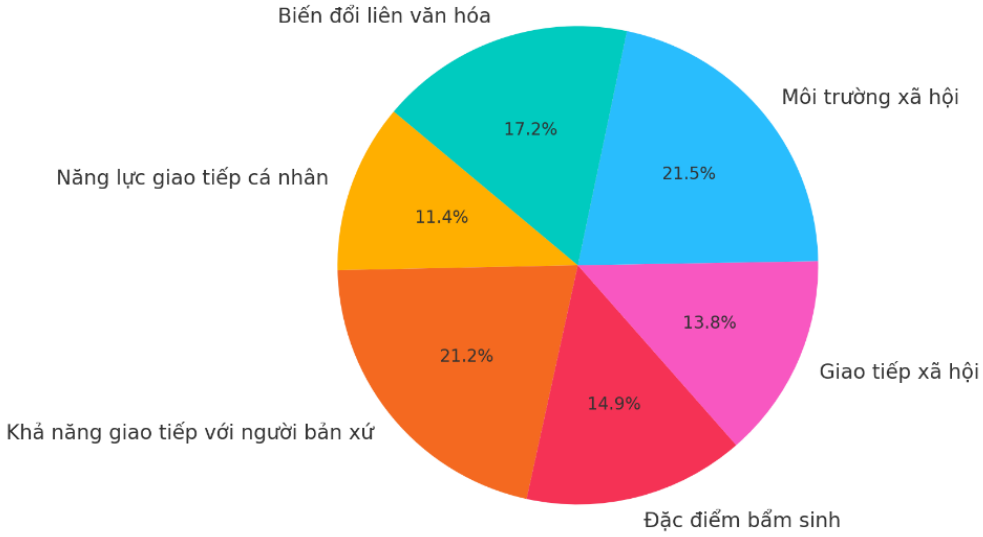
Dữ liệu thu được sẽ được phân tích nội dung theo chủ đề, mã hóa các tình huống liên quan đến giao tiếp: hiểu nhầm, im lặng, cảm xúc dồn nén, giao tiếp lệch. Lý giải hành vi theo Lý thuyết giao tiếp liên văn hóa ngữ cảnh cao của Hall.

3. KẾT QUẢ VÀ THẢO LUẬN

3.1. Thực trạng và thách thức của việc thích nghi của TTS UEF tại Nhật Bản

Dựa vào mô hình thích nghi văn hóa của Kim (2001), chúng tôi tiến hành phỏng vấn sâu kết hợp ghi chú từ kinh nghiệm điều phối chương trình của tác giả, chúng tôi thu thập kết quả tỷ lệ trung bình các nhóm thách thách văn hóa của TTS UEF tại Nhật Bản như sau:

Biểu đồ 1. Tỷ lệ trung bình các nhóm thách thức văn hóa của TTS UEF tại Nhật Bản



(Nguồn: Phỏng vấn của tác giả)

Trong 6 nhóm trên, chúng tôi phân tích kết quả phỏng vấn sâu kết hợp ghi chép phản tư, thu được 24 nhóm biến, cụ thể với % xuất hiện của các biến như sau:

Bảng 2. Thống kê và mã hóa các thách thức thích nghi văn hóa từ lý thuyết Thích nghi văn hóa (Kim, 2001) của TTS UEF tại Nhật Bản

Mã biến	Nội dung phỏng vấn	%
	Năng lực giao tiếp cá nhân (Personal communication competence)	
PCC1	Thiếu kỹ năng sử dụng ngôn ngữ cử chỉ	50%
PCC2	Người Nhật nói nhanh quá, nghe không kịp	40%
PCC3	Người Nhật nói nhỏ quá, không nghe ra từ	20%
PCC4	Khó khăn trong việc chọn từ diễn đạt ý kiến cá nhân một cách tinh tế, đúng ngữ cảnh	60%
PCC5	Không hiểu ngữ điệu của người Nhật	30%
	Khả năng giao tiếp với người bản xứ (Host communication competence)	
HCC1	Người Nhật giữ khoảng cách, không sẵn lòng giao tiếp thân mật với người Việt	70%

HCC2	Không hiểu ý người Nhật (quản lý, đồng nghiệp, khách hàng, người bản xứ,…)	100%
HCC3	Không nhận được phản hồi từ người Nhật, hỏi không trả lời	70%
HCC4	Không biết phải làm gì, không biết đang làm đúng hay sai	80%
HCC5	Không thể nói thật lòng, không thể nói trực tiếp	80%
HCC6	Bị cho là phản ứng thái quá, thiếu kiềm chế	70%
HCC7	Quản lý và khách Nhật phản ứng tiêu cực hoặc phân biệt khi biết bạn là người Việt	50%
	Đặc điểm bẩm sinh (Predisposition)	
PD1	Tính cách rạch ròi, quen nói thẳng – gây mâu thuẫn trong môi trường giao tiếp gián tiếp	50%
PD2	Cảm xúc cá nhân mạnh (đa cảm, dễ xúc động), dễ bị tổn thương khi không được thấu hiểu	60%
PD3	Thích giúp đỡ người khác và mong muốn được người khác giúp đỡ nhưng người Nhật không cần	50%
PD4	Muốn được tỉ tê, tâm sự, giãy bày nhưng người Nhật không ai làm như vậy	40%
PD5	Tính cách xởi lởi, "chín bỏ làm mười" nhưng người Nhật xét nét không như vậy	60%
	Giao tiếp xã hội (Social communication)	
SC1	Bị cô lập trong giao tiếp, người Nhật không muốn kết bạn hoặc chia sẻ cá nhân	60%
SC2	Không nhận được sự giúp đỡ từ đồng nghiệp Nhật	50%
SC3	Bị từ chối thẳng, không được giải thích lý do	40%
SC4	Bị nói xấu sau lưng	70%
SC5	Bị phớt lờ, xem như không có	40%
SC6	Mâu thuẫn nội bộ giữa thực tập sinh Việt (ganh tỵ, phân chia mới – cũ)	30%
	Môi trường xã hội (Environment)	
ENV1	Công ty không có cơ chế hỗ trợ tinh thần, pháp lý, ngôn ngữ hoặc sinh hoạt như bản thân nghĩ	80%
ENV2	Xã hội Nhật khép kín, phân biệt ngầm	70%
	Biến đổi liên văn hóa (Intercultural transformation)	
ICT1	Cảm giác 'vô hình', mất phương hướng về giá trị sống, bị hòa tan vào guồng máy công việc	60%
ICT2	Hình thành khả năng chịu đựng, điều chỉnh bản thân để 'diễn' hoặc 'im lặng mà sống'	80%

(Nguồn: Tác giả thống kê – phân tích)

Sau khi phỏng vấn sâu kết hợp ghi chép quan sát của tác giả, nghiên cứu thu được 24 biến dựa trên Mô hình thích nghi văn hóa của Kim (2001). *Ở nhóm Nhóm Personal Communication Competence (Năng lực giao tiếp cá nhân)*, phổ biến nhất là PCC4 – Khó chọn từ diễn đạt tinh tế (60%). Các biến còn lại dao động từ 20% – 50%, cho thấy nhiều TTS gặp khó khăn trong diễn đạt, hiểu ý qua ngôn ngữ và ngữ điệu. *Ở nhóm Host Communication Competence (Giao tiếp với người bản xứ)* biến chiếm tỉ lệ cao nhất toàn bảng là HCC2 – Không hiểu ý người Nhật (100%). Các biến HCC3, HCC4, HCC5 đều đạt 70%–80%, phản ánh sự thiếu phản hồi rõ ràng, giao tiếp một chiều, thiếu minh bạch trong quan hệ giữa người Nhật và thực tập sinh. Đây là nhóm yếu tố gây khó khăn lớn nhất cho quá trình thích nghi. TTS bị thụ động hóa, không rõ mình làm đúng hay sai, và cảm thấy không được công nhận. *Nhóm Predisposition (Đặc điểm cá nhân, bẩm*

sinh), các biến dao động 40–60%, với điểm nhấn là PD2 và PD5 – Cảm xúc mạnh, thẳng thắn, hiếu khách theo kiểu Việt không hợp chuẩn Nhật. *Nhóm Social Communication (Giao tiếp xã hội),* SC1, SC4, SC6 đều ở mức 60–70% thể hiện cô lập xã hội, xung đột nội bộ và bị loại trừ giao tiếp. TTS không chỉ gặp rào cản ngôn ngữ mà còn không hòa nhập được với cộng đồng người Nhật và cả cộng đồng Việt, tạo nên cảm giác lạc lõng kép. *Nhóm Environment (Môi trường xã hội),* mặc dù trường học và phía công ty Nhật đều có cam kết hỗ trợ TTS tối đa, tuy nhiên có đến 80% (ENV1) TTS cho rằng việc hỗ trợ không như mong đợi, không giống hình dung của SV. Nhóm Intercultural Transformation (Biến đổi liên văn hóa) với ICT1: 60% cho thấy sự thay đổi bên trong như mất phương hướng, cảm giác hòa tan, là kết quả của quá trình thích nghi bị động, cam chịu.

Từ kết quả trên có thể thấy vấn đề giao tiếp không hiểu ý chiếm tỷ trọng rất lớn: HCC2 – Không hiểu ý người Nhật (quản lý, đồng nghiệp, khách hàng...): 100%; HCC3 – Không được phản hồi rõ ràng (70%); HCC4 – Không biết đúng sai vì không ai nói rõ (80%); PCC5 – Không hiểu ngữ điệu (30%); SC3 – Bị từ chối nhưng không biết lý do (40%). Tổng hợp cho thấy >80% thực tập sinh gặp trở ngại do không giải mã được thông điệp ngầm trong giao tiếp – một biểu hiện rõ của Tatemae – Honne trong văn hóa giao tiếp Nhật. Do đó, dựa vào kết quả phỏng vấn sâu, chúng tôi lý giải từng tình huống cụ thể khi TTS UEF gặp phải trong ngành nhà hàng – khách sạn ở Nhật Bản trong phần sau.

3.2. Lý giải Tatemae – Honne trong các tình huống giao tiếp từ phỏng vấn sâu bán cấu trúc

Chúng tôi trích xuất các tình huống từ phỏng vấn sâu, soi chiếu nó ở Tatemae – Honne, cụ thể kết quả như sau:

Bảng 3. Bảng đối chiếu tình huống và Tatemae - Honne mà TTS UEF gặp phải khi TTTT ở Nhật Bản

Tình huống	Tatemae kì vọng TTS	Honne của TTS
Khách hàng phàn nàn về một lỗi nhỏ (bát đũa đặt lệch,…).	“Xin lỗi, sẽ kiểm tra ngay”	"Chuyện bé xíu mà khách làm căng." / "Tôi luôn sai, lại phải xin lỗi dù không phải lỗi mình."
Khách yêu cầu một việc không thể thực hiện (trái quy định, hoặc trong thời điểm không thể).	“Xin lỗi, tôi sẽ cố gắng hết sức ạ”	"Trả lời là cố gắng hết sức nhưng yêu cầu vô lý quá. Đương nhiên là không được rồi. Trả lời vậy thôi chứ không làm gì cả"
Được khách khen tiếng Nhật.	“Ôi không, tôi vẫn còn kém lắm ạ”	"Công nhận mình nói cũng khá mà!" / "Được khen vui ghê."
Khách tỏ ra không hài lòng nhưng im lặng.	Khách: (Im lặng, trả tiền, rời đi nhanh chóng).	Khách: "Dịch vụ/Đồ ăn không tốt lắm nhưng ngại nói ra." TTS: "Hình như khách không vui?"
Bị cấp trên chỉ trích trước mặt khách, đồng nghiệp,…	(Im lặng, cúi đầu) “Xin lỗi ạ”	"Không phải lỗi của mình, cũng không biết mình sai lỗi gì” / "Mất mặt quá."
Khuyên khách nước ngoài thử hết đặc sản (dù biết có món không hợp).	“Món nào cũng ngon, mời thử ạ”	"Món này chắc khách Tây không ăn được đâu." / "Biết khuyên món nào bây giờ?"
Nhận chỉ thị không rõ ràng từ cấp trên (Senpai).	“Vâng, hiểu rồi, tôi sẽ thử làm”	"Chả hiểu 'làm phù hợp' là gì? Sao không nói rõ hơn? Cũng không chỉ người ta làm"
Bị Senpai chỉ lỗi (có thể hơi gay gắt).	“Vâng, xin lỗi, sẽ chú ý ạ”	"Biết rồi mà, nói nhẹ nhàng không được à? Có cần làm lố lên không? Mình ào ào thì được, người ta nói tí lại bảo thiếu kiềm chế"
Được quản lý "nhờ" làm thêm giờ (OT), đổi ca hoặc làm thay ca của đồng nghiệp người Nhật.	“Vâng, không sao đâu ạ”	"Lại OT? Mệt chết đi được, muốn về nhà nghỉ ngơi. Nhưng không dám từ chối. Cũng không được hỏi về phí tăng ca, làm thay."
Được quản lý khen chung chung "Em cố gắng nhỉ".	“Em cảm ơn ạ!”	"Sếp có thật sự thấy mình làm tốt không, hay chỉ nói xã giao?"
Đồng nghiệp than phiền với TTS, nhưng tỏ ra ổn với quản lý.	Đồng nghiệp với quản lý “Vâng, thuận lợi ạ!”	Đồng nghiệp với TTS sau đó: “Mệt quá, việc nhiều quá.”

Bị Senpai "đề cử" làm việc không ai muốn làm.	“Vâng, em sẽ cố gắng ạ!”	"Biết ngay mà. Lại đến lượt mình. Cũng chẳng biết phải làm sao luôn"
Quản lý hỏi thăm tình hình chung "Ổn không?".	“Vâng, em ổn, không vấn đề gì’	"Có cả đống vấn đề đây nhưng nói ra làm gì?" / "Sợ nói ra lại thêm phiền phức."
Sếp đưa ra chỉ đạo thiếu hợp lý.	“Vâng, đã rõ ạ”	"Chỉ đạo này vô lý/không thực tế." / "Làm theo chắc chắn có vấn đề."
Sếp yêu cầu thay đổi (trang trí nhà hàng, thực đơn, quy trình,… nhân viên không đồng ý).	“Vâng, sẽ tiến hành như vậy ạ”	"Trang trí cũ đẹp/hợp lý hơn nhiều." / "Ý tưởng của sếp không ổn lắm."
Được mời đi nhậu sau giờ làm (Nomikai).	“Vâng, nhất định ạ!”	"Không muốn đi chút nào, tốn tiền, mệt mỏi, lại phải nghe sếp/senpai nói..."
TTS tự mình gây ra lỗi do không được hướng dẫn kỹ	“Xin lỗi, do tôi bất cẩn”	"Chỉ là lỗi nhỏ thôi mà." / "Do bị áp lực quá nên nhầm." / "Hướng dẫn không kỹ."
Được hỏi về đồ ăn nhân viên.	“Ngon ạ!”	"Đồ ăn nhân viên chán ngắt." / "Không hợp khẩu vị mình lắm."
Không đồng ý với kế hoạch trong cuộc họp.	“Vâng, tôi nghĩ cách đó được”	"Làm cách này không hiệu quả đâu." / "Mình nghĩ có cách khác tốt hơn."
Nhân viên mới bị sai vặt liên tục.	“Vâng ạ!”	"Toàn việc lặt vặt, chẳng học được gì." / "Mệt quá."
Được thăng chức nhưng không hài lòng với nhiệm vụ mới. Thật chất là bắt làm thêm việc, không phải hiểu biết của TTS, không tăng lương, không hướng dẫn.	“Cảm ơn ạ. Tôi sẽ cố gắng hết sức”	"Chức mới trách nhiệm nặng quá." / "Việc này không đúng sở trường/mong muốn của mình."

(Nguồn: Tác giả phân tích)

Ghi nhận thực trạng trong các tình huống của TTS UEF, có tể thấy Sự lịch sự, nhún nhường, tránh xung đột là chuẩn mực được duy trì nhất quán trong mọi tình huống giao tiếp. Trong khi đó, những cảm xúc thật như mệt mỏi, bức xúc, không đồng tình, nhưng thường bị kìm nén vì sợ mất mặt, phá vỡ hài hòa hoặc ảnh hưởng đến đánh giá cá nhân. Trong công việc, Nhân viên thường xin lỗi, khen ngợi hoặc hứa hẹn ngay cả khi yêu cầu của khách không hợp lý. Mặc dù điều này phù hợp với tinh thần Omotenashi – phục vụ tận tâm, luôn làm khách cảm thấy hài lòng, bất kể cảm xúc thật của người phục vụ nhưng cũng gây ra những dồn nén nhất định. Trong giao tiếp công sở thì nhân viên rất hiếm khi phản đối trực tiếp hoặc nêu ý kiến của mình với cấp trên, ngay cả khi chỉ đạo không rõ ràng hoặc không hợp lý. Sự phục tùng này là biểu hiện rõ của văn hóa tôn trọng thứ bậc (senpai-kouhai), và lo sợ bị đánh giá tiêu cực nếu bộc lộ sự không hài lòng. Nhân viên thường hy sinh mong muốn cá nhân để giữ hình ảnh tích cực, chịu đựng nhiệm vụ không mong muốn hoặc khen khiêm tốn dù tự hào về bản thân.

Tóm lại, có thể thấy việc phân nhóm cho thấy rõ Tatemae – Honne là cơ chế xã hội quan trọng giúp người Nhật duy trì sự hài hòa, kỷ luật và tinh thần tập thể, nhưng cũng có thể dẫn đến sự kiềm chế cảm xúc, áp lực tâm lý, đặc biệt trong môi trường dịch vụ vốn nhiều áp lực như nhà hàng – khách sạn.

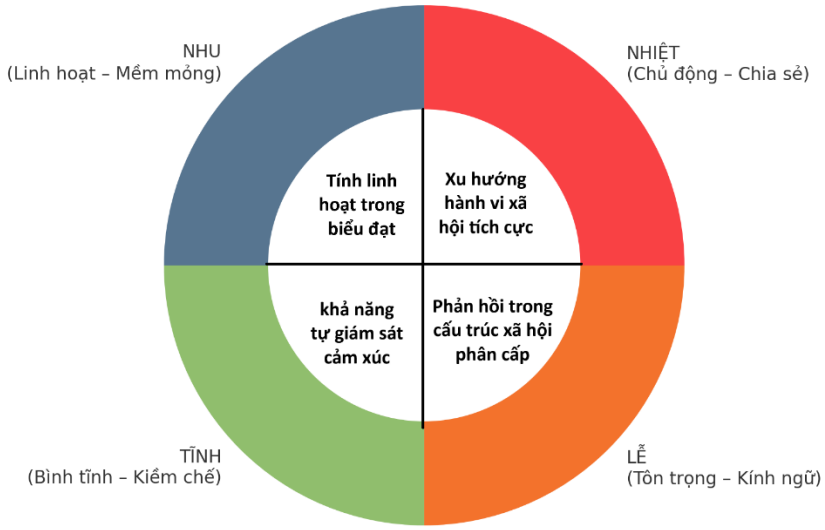
4. KẾT LUẬN

Dựa vào các kết quả nghiên cứu trên, có thể thấy vấn đề giao tiếp không hiểu ý chiếm tỷ trọng lớn trong vấn đề thích nghi văn hóa của TTS UEF trong ngành nhà hàng – khách sạn tại Nhật Bản. Các tình huống giao tiếp của TTS UEF xoay quanh các vấn đề với khách hàng, cấp trên, đồng nghiệp và một số tình huống cá nhân khác. Những khó khăn cụ thể với TTS UEF như: (1) Không quen nói vòng vo; (2) Bối rối khi Tatemae không phản ánh đúng thực tế; (3) Áp lực vì không biết thể hiện Honne như thế nào để đạt được kì vọng.

Với đặc tính của người Việt Nam hiếu khách, xởi lởi, ham học hỏi, thích giúp đỡ, thích chia sẻ,.. rõ ràng có sự đối

chọi trong thích nghi văn hóa giao tiếp của người Nhật. Dựa vào đặc tính người Việt, chúng tôi đề xuất mô hình "Nhiệt – Lễ – Tĩnh – Nhu" nhằm tiết chế và kiểm soát tình huống giao tiếp của TTS trong môi trường ứng xử Nhật Bản.

Biểu đồ 2. Đề xuất mô hình thích nghi văn hóa giao tiếp của người Việt Nam tại Nhật Bản



(Nguồn: Tác giả)

Trong đó, các yếu tố cụ thể vận hành như sau:

Bảng 4. Đề xuất mô hình thích nghi văn hóa giao tiếp Nhật Bản

Yếu tố	Biểu hiện	Ý nghĩa
Prosocial Disposition (Xu hướng hành vi xã hội tích cực - Nhiệt)	Chủ động, thân thiện, sẵn sàng hỗ trợ.	Khuynh hướng giao tiếp hướng đến người khác một cách tích cực: thân thiện, hỗ trợ, hợp tác
Hierarchical Politeness (Phản hồi trong cấu trúc xã hội phân cấp - Lễ)	Kính trọng, sử dụng kính ngữ, tuân thủ thứ bậc.	Xu hướng duy trì giao tiếp theo thứ bậc và lễ nghi – phù hợp với xã hội phân cấp như Nhật Bản. Bao gồm sử dụng kính ngữ, né tránh phủ định trực tiếp, giữ thể diện (face-saving strategy).
Affective Self-Regulation (Khả năng tự giám sát cảm xúc - Tĩnh)	Bình tĩnh, giữ cảm xúc ổn định, không phản ứng quá mức.	Khả năng điều chỉnh biểu hiện cảm xúc theo chuẩn mực xã hội – thường thấy trong văn hóa "high-context" như Nhật. Gắn với khái niệm "self-monitoring"
Contextual Adaptability (Tính linh hoạt trong biểu đạt – Nhu)	Linh hoạt, mềm dẻo trong xử lý tình huống.	Khả năng điều chỉnh phong cách giao tiếp theo từng tình huống, người đối thoại, và kỳ vọng văn hóa – liên quan đến "Intercultural Communication Competence"

(Nguồn: Tác giả)

Đề tài đã tiến hành khảo sát và phân tích hiện tượng Tatemae – Honne trong giao tiếp của người Nhật dưới góc nhìn của thực tập sinh (TTS) Việt Nam trong ngành nhà hàng – khách sạn, từ đó làm rõ những thách thức giao tiếp điển hình mà TTS gặp phải khi làm việc trong môi trường văn hóa Nhật Bản. Qua việc tổng hợp hơn 20 tình huống thực tế và phân tích đặc điểm hành vi, đề tài nhận thấy rằng các khó khăn trong giao tiếp không chỉ bắt nguồn từ rào cản ngôn ngữ, mà còn sâu sắc hơn – đó là sự khác biệt trong chiến lược thể hiện cảm xúc, duy trì hài hòa quan hệ, và xử lý mâu thuẫn gián tiếp. Trên cơ sở đó, đề tài đã đề xuất mô hình giao tiếp "Nhiệt – Lễ – Tĩnh – Nhu" – một khung năng lực thích nghi mang bản sắc văn hóa Việt, kết hợp với yêu cầu tương tác xã hội của môi trường Nhật.

Tuy nhiên, phạm vi của đề tài hiện tại chủ yếu dừng lại ở mức xây dựng lý thuyết thông qua quan sát, tổng hợp tình huống và đối chiếu lý thuyết, chưa đi sâu vào kiểm chứng mô hình bằng dữ liệu thực nghiệm. Đây là hạn chế có chủ đích của nghiên cứu định hướng, nhưng đồng thời cũng mở ra cơ hội cho các nghiên cứu tiếp theo.

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CÁC YẾU TỐ ẢNH HƯỞNG ĐẾN VIỆC ÁP DỤNG LOGISTICS XANH TẠI CÁC DOANH NGHIỆP VẬN TẢI HÀNG HÓA ĐƯỜNG BỘ THÀNH PHỐ HỒ CHÍ MINH

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TÓM TẮT

Cùng với sự phát triển của ngành logistics, Việt Nam đang đối mặt với vấn đề ô nhiễm môi trường nghiêm trọng, đặc biệt trong vận tải hàng hóa đường bộ. Nghiên cứu này xác định và đánh giá các yếu tố ảnh hưởng đến việc áp dụng logistics xanh tại các doanh nghiệp vận tải hàng hóa đường bộ ở TP.HCM, thông qua khảo sát 325 nhân sự. Kết quả đã cho thấy tám yếu tố chính tác động đến việc triển khai hoạt động logistics, bao gồm lợi thế tương đối, tính tương thích, độ phức tạp, sự hỗ trợ từ tổ chức, chất lượng nguồn nhân lực, áp lực từ khách hàng, áp lực từ quy định, và sự hỗ trợ từ chính phủ. Kết quả của nghiên cứu cung cấp cơ sở lý luận và thực tiễn quan trọng, hỗ trợ các doanh nghiệp và nhà hoạch định chính sách trong việc phát triển các chiến lược logistics xanh, từ đó thúc đẩy sự phát triển bền vững cho ngành vận tải hàng hóa đường bộ tại TP.HCM.

Từ khóa: logistics xanh, vận tải đường bộ, phát triển bền vững, giảm thiểu khí thải.

1. GIỚI THIỆU

Ngành logistics tại việt nam đang phát triển mạnh mẽ, đóng vai trò then chốt trong chuỗi cung ứng và hoạt động thương mại. tuy nhiên, đi kèm với sự phát triển này là những thách thức nghiêm trọng về môi trường. theo báo cáo của bộ tài nguyên và môi trường (2019), hoạt động vận tải hàng hóa đường bộ chiếm tới 85% tổng lượng phát thải khí co_2 trong ngành giao thông vận tải, với hơn 30 triệu tấn co_2 thải ra mỗi năm.

Để giảm thiểu những tác động tiêu cực này, chính phủ Việt Nam đã đưa ra nhiều chính sách quan trọng nhằm thúc đẩy phát triển bền vững trong lĩnh vực vận tải và logistics. Quyết định số 1658/QĐ-TTg ban hành Chiến lược tăng trưởng xanh quốc gia giai đoạn 2021-2030, tầm nhìn 2050, nhấn mạnh việc giảm phát thải khí nhà kính và chuyển đổi sang các hoạt động kinh tế xanh, bao gồm logistics xanh. Bên cạnh đó, Quyết định số 855/QĐ-TTg ngày 6/6/2011 về dự án phòng chống ô nhiễm trong hoạt động giao thông vận tải đã đặt mục tiêu xây dựng các giải pháp giảm thiểu phát thải khí nhà kính trong ngành vận tải, đặc biệt là vận tải đường bộ.

Trước bối cảnh này, logistics xanh đã trở thành xu hướng không thể thiếu nhằm hướng tới phát triển bền vững. Việc áp dụng logistics xanh không chỉ góp phần giảm thiểu tác động tiêu cực đến môi trường mà còn nâng cao hiệu quả kinh tế và tạo dựng hình ảnh tích cực cho doanh nghiệp. Tuy nhiên, việc áp dụng logistics xanh vẫn gặp nhiều khó khăn do thiếu sự hỗ trợ từ tổ chức, hạn chế về nguồn lực và áp lực từ chi phí.

Logistics xanh, với mục tiêu giảm thiểu tác động môi trường, đã được nghiên cứu rộng rãi trong nhiều bối cảnh quốc tế. Các nghiên cứu như của Lin và Ho (2010) tại Trung Quốc hay Sureeyatanapas và cộng sự (2018) tại Thái Lan, nghiên cứu của Lee và cộng sự (2018) tại Hàn Quốc. Các nghiên cứu này đã chỉ ra rằng các yếu tố công nghệ, tổ chức, áp lực từ khách hàng, quy định của chính phủ về môi trường đóng vai trò quan trọng trong việc thúc đẩy các doanh nghiệp áp dụng thực hành xanh. Trong đó, các yếu tố như lợi thế tương đối, tính tương thích, và sự hỗ trợ tổ chức và chính phủ thường được coi là động lực chính. Trái lại, độ phức tạp và sự thiếu hụt nguồn lực là những rào cản lớn cho việc áp dụng logistics xanh. Tại Việt Nam, logistics xanh vẫn là một lĩnh vực nghiên cứu mới mẻ. Các nghiên cứu trong nước như của Trần & Phạm (2023) đã nhấn mạnh vai trò của chính sách hỗ trợ từ chính phủ và nhận thức của doanh nghiệp trong việc triển khai các biện pháp xanh hóa. Tuy nhiên, phần lớn các nghiên cứu tập trung vào toàn bộ ngành logistics nói chung, trong khi lĩnh vực vận tải hàng hóa đường bộ - một ngành đóng góp lớn vào lượng phát thải – vẫn chưa được nghiên cứu đầy đủ. Vì vậy, đề tài này nhằm lấp đầy khoảng trống đó bằng cách xác định các yếu tố ảnh hưởng đến việc áp dụng logistics xanh tại các doanh nghiệp vận tải hàng hóa đường bộ ở Thành phố Hồ Chí Minh, góp phần cung cấp cơ sở lý luận và

thực tiễn để cải thiện hiệu quả hoạt động và phát triển bền vững trong ngành.

2. TỔNG QUAN LÝ THUYẾT, PHÁT TRIỂN GIẢ THUYẾT VÀ MÔ HÌNH NGHIÊN CỨU

2.1. Các lý thuyết nền về việc ứng dụng công nghệ mới

Lý thuyết khuếch tán đổi mới (Innovation Diffusion Theory - IDT)

Lý thuyết này được phát triển bởi Rogers (1962), lý thuyết khuếch tán đổi mới giải thích quá trình mà một đổi mới, như công nghệ mới hoặc ý tưởng, được chấp nhận và lan truyền trong xã hội hoặc tổ chức. Theo lý thuyết này, năm yếu tố chính ảnh hưởng đến việc áp dụng đổi mới bao gồm: lợi thế tương đối, tính tương thích, độ phức tạp, khả năng thử nghiệm và khả năng quan sát. Lý thuyết này cũng phân nhóm các đối tượng theo khả năng tiếp nhận đổi mới thành năm loại: nhóm đổi mới, nhóm chấp nhận sớm, nhóm đa số sớm, nhóm đa số muộn, và nhóm chậm trễ.

Khung lý thuyết Công nghệ - Tổ chức - Môi trường (TOE Framework)

Khung lý thuyết này được phát triển bởi Tornatzky & Fleischer (1990) nhằm giải thích các yếu tố ảnh hưởng đến việc áp dụng công nghệ trong tổ chức. Khung lý thuyết TOE đã được sử dụng rộng rãi trong các nghiên cứu về logistics và các lĩnh vực khác để phân tích các yếu tố ảnh hưởng đến việc triển khai đổi mới. Khung lý thuyết này cung cấp một góc nhìn toàn diện, giúp các nhà nghiên cứu và quản lý hiểu rõ hơn về mối quan hệ giữa các yếu tố công nghệ, tổ chức, và môi trường trong việc thúc đẩy áp dụng các giải pháp công nghệ tiên tiến. Theo khung lý thuyết này, việc triển khai công nghệ mới phụ thuộc vào ba nhóm yếu tố chính: công nghệ, tổ chức và môi trường.

2.2 Các nghiên cứu thực tiễn liên quan

Các nghiên cứu về logistics xanh đã được triển khai tại nhiều quốc gia, cung cấp những góc nhìn đa chiều về các yếu tố ảnh hưởng đến việc áp dụng logistics xanh tại doanh nghiệp. Các yếu tố phổ biến được nhắc đến bao gồm chính sách hỗ trợ, áp lực từ khách hàng, công nghệ tiên tiến, quy định của chính phủ và văn hóa tổ chức. Tuy nhiên, các nghiên cứu chỉ ra rằng mức độ ảnh hưởng của các yếu tố này thay đổi tùy thuộc vào ngữ cảnh quốc gia và đặc thù ngành.

Chẳng hạn, tại Trung Quốc và Việt Nam, độ phức tạp và sự không chắc chắn về môi trường được xem là rào cản lớn nhất (Lin & Ho, 2010; Trần & Phạm, 2023). Trong khi đó, các nghiên cứu tại Thái Lan và Malaysia nhấn mạnh vai trò của quy mô doanh nghiệp và áp lực khách hàng (Sureeyatanapas và cộng sự, 2018; Shaharudin và cộng sự, 2018). Nghiên cứu Lee và cộng sự (2018) tại Hàn Quốc cho thấy kỳ vọng xã hội và sự hỗ trợ từ tổ chức có tác động lớn đến sự áp dụng logistics xanh. Từ việc tổng hợp các nghiên cứu thực liên quan nhóm tác giả nhận thấy các yếu tố tác động đến việc áp dụng logistics xanh tại các doanh nghiệp được chia thành hai nhóm yếu tố là các yếu tố bên ngoài và nhóm các yếu tố nội tại doanh nghiệp.

Nhóm yếu tố tác động bên ngoài:

Khung chính sách và quy định của chính phủ đóng vai trò then chốt trong việc thúc đẩy logistics xanh. Nhiều nghiên cứu chỉ ra rằng việc áp dụng nguyên tắc 'người gây ô nhiễm phải trả phí' đã tạo động lực cho doanh nghiệp tuân thủ các tiêu chuẩn môi trường nghiêm ngặt hơn. Các yếu tố như năng lực quản trị của chính phủ và sự giám sát xã hội cũng được xác định là quan trọng trong việc tăng cường hiệu quả chính sách logistics xanh (Zhang và cộng sự, 2020).

Động lực kinh tế và thị trường là một động lực mạnh mẽ thúc đẩy doanh nghiệp áp dụng logistics xanh. Thông qua áp dụng logistics xanh, các doanh nghiệp có thể giảm chi phí vận hành, nâng cao hiệu quả sử dụng tài nguyên và cải thiện hình ảnh thương hiệu. Các nghiên cứu cũng cho thấy thị trường ngày càng ưa chuộng những sản phẩm và dịch vụ thân thiện với môi trường (Zhu & cộng sự, 2018).

Tiến bộ công nghệ đóng vai trò quan trọng hỗ trợ doanh nghiệp triển khai logistics xanh. Từ việc áp dụng hệ thống vận tải tiết kiệm nhiên liệu đến các công nghệ số giúp tối ưu hóa chuỗi cung ứng. Những đổi mới này không chỉ giảm lượng khí thải mà còn nâng cao năng suất (Zhao và cộng sự, 2016). Mặt khác, nghiên cứu của Sureeyatanapas và cộng sự (2018) cũng cho thấy việc sử dụng các công nghệ thông minh và lập kế hoạch tuyến đường được xem là chiến lược cốt lõi để giảm phát thải và tối ưu hóa vận hành tại các doanh nghiệp logistics.

Áp lực từ các bên liên quan như sự ủng hộ từ các tổ chức phi chính phủ và áp lực từ cộng đồng cũng thúc đẩy doanh nghiệp chuyển sang áp dụng logistics xanh (Lee và cộng sự, 2018). Mặt khác, người tiêu dùng ngày càng quan tâm đến các sản phẩm và dịch vụ thân thiện với môi trường. Cụ thể, nghiên cứu Sureeyatanapas và cộng sự (2018), Trần & Phạm (2023) đều cho thấy rằng yếu tố áp lực khách hàng đóng vai trò quyết định đến việc triển khai hoạt động logistics xanh

tại các doanh nghiệp.

Nhóm yếu tố tác động bên trong

Các yếu tố về quản trị doanh nghiệp như chiến lược phát triển bền vững và hệ thống quản trị hiệu quả giúp doanh nghiệp tích hợp logistics xanh vào hoạt động (Chien và cộng, 2014). Mặt khác, nghiên cứu của Lin & Ho (2010) cho thấy tính tương thích của việc ứng dụng logistics xanh với quy trình quản trị, kinh doanh của doanh nghiệp và các biện pháp hỗ trợ từ doanh nghiệp góp phần quan trọng để triển khai thành công các tiêu chuẩn logistics xanh tại các doanh nghiệp.

Thách thức về cơ sở hạ tầng, năng lực vận hành và chi phí là những trở ngại lớn trong việc triển khai logistics xanh của các doanh nghiệp đặc biệt đối với các doanh nghiệp vừa và nhỏ. Tuy nhiên, việc tối ưu hóa quy trình như sử dụng logistics ngược và tái chế tài nguyên có thể giúp cải thiện phần nào hiệu quả của các doanh nghiệp triển khai logistics xanh (Gupta & Jain, 2021). Bên cạnh đó, nghiên cứu của Trần & Phạm (2023) cũng góp phần khẳng định yếu tố chi phí đầu tư là rào cản quan trọng việc triển khai logistics xanh tại các doanh nghiệp tại Việt Nam.

Tóm lại, các nghiên cứu trước đây đều đồng thuận rằng tính tương thích và sự hỗ trợ từ tổ chức và chính phủ là những yếu tố thúc đẩy quan trọng trong việc áp dụng logistics xanh. Điều này cho thấy vai trò của môi trường chính sách và cơ sở hạ tầng tại mỗi quốc gia trong việc thúc đẩy hoặc cản trở đổi mới. Những kết quả này thúc đẩy nhóm tác giả tập trung vào việc phân tích bối cảnh Việt Nam, nhằm làm rõ các yếu tố đặc thù liên quan đến logistics xanh trong ngành vận tải hàng hóa tại TP.HCM.

2.3 Các giả thuyết nghiên cứu

Các nghiên cứu trước đã chỉ ra rằng lợi ích kinh tế là những yếu tố thúc đẩy mạnh mẽ việc áp dụng logistics xanh. Theo Muñoz và cộng sự (2020), các doanh nghiệp có thể tiết kiệm chi phí vận hành thông qua việc sử dụng các phương tiện tiết kiệm nhiên liệu và tối ưu hóa quy trình vận tải. Ngoài ra, việc áp dụng logistics xanh còn giúp doanh nghiệp nâng cao uy tín, hình ảnh thương hiệu trong mắt khách hàng và từ đó nâng cao hiệu quả kinh doanh, điều này đã được Sarkis và cộng sự (2010) khẳng định.

Do vậy, nhóm tác giả xây dựng **giả thuyết H_1**: lợi ích kinh tế ảnh hưởng tích cực đến việc áp dụng logistics xanh tại các doanh nghiệp vận tải hàng hóa đường bộ.

Tính tương thích giữa các tiêu chuẩn logistics xanh và các quy trình hiện có trong doanh nghiệp là yếu tố quan trọng tác động đến việc thực hành logistics xanh tại các doanh nghiệp. Theo Zhao và cộng sự (2016), khi các biện pháp xanh có thể dễ dàng được tích hợp vào các quy trình hoạt động của doanh nghiệp, tỷ lệ áp dụng sẽ cao hơn.

Vì vậy, nhóm tác giả hình thành giả thuyết nghiên cứu sau **giả thuyết H_2**: tính tương thích giữa logistics xanh và các quy trình vận hành hiện tại của doanh nghiệp ảnh hưởng tích cực đến mức độ áp dụng logistics xanh.

Harris và cộng sự (2016), Lee và cộng sự (2018) đã chỉ ra rằng các doanh nghiệp thường gặp phải các vấn đề về tài chính và kỹ thuật khi áp dụng logistics xanh, đặc biệt đối với các doanh nghiệp vừa và nhỏ.

Trên cơ sở này, nhóm tác giả hình thành **giả thuyết H_3**: độ phức tạp của việc áp dụng logistics xanh có tác động tiêu cực đến quyết định áp dụng của doanh nghiệp vận tải.

Chien và cộng (2014) cho rằng sự cam kết của ban lãnh đạo đối với việc áp dụng logistics xanh là yếu tố quyết định, vì họ có thể cung cấp tài nguyên và tạo ra một môi trường thuận lợi cho việc áp dụng các sáng kiến này.

Do vậy, nhóm tác giả hình thành **giả thuyết H_4**: sự hỗ trợ từ tổ chức, bao gồm ban lãnh đạo và các bộ phận trong doanh nghiệp tác động tích cực đến việc áp dụng logistics xanh.

Nghiên cứu của Bai và cộng sự (2019) cho rằng việc đào tạo nhân viên và nâng cao nhận thức về môi trường sẽ tạo ra những thay đổi tích cực trong việc áp dụng logistics xanh. Các doanh nghiệp có đội ngũ nhân sự được đào tạo bài bản sẽ dễ dàng triển khai các biện pháp bảo vệ môi trường.

Do vậy, nhóm tác giả đề xuất **giả thuyết H_5**: chất lượng nguồn nhân lực trong doanh nghiệp có ảnh hưởng tích cực đến khả năng triển khai logistics xanh.

Áp lực từ khách hàng ngày càng trở thành yếu tố quan trọng trong việc thúc đẩy việc áp dụng logistics xanh. Tate và cộng sự (2014) chỉ ra rằng các khách hàng ngày càng yêu cầu các doanh nghiệp vận tải thực hiện các biện pháp bảo vệ môi trường, do đó, doanh nghiệp phải thích ứng với yêu cầu này để duy trì mối quan hệ lâu dài.

Do vậy, nhóm tác giả hình thành giả thuyết nghiên cứu sau, **giả thuyết H_6**: áp lực từ khách hàng có tác động mạnh mẽ đến việc doanh nghiệp áp dụng logistics xanh.

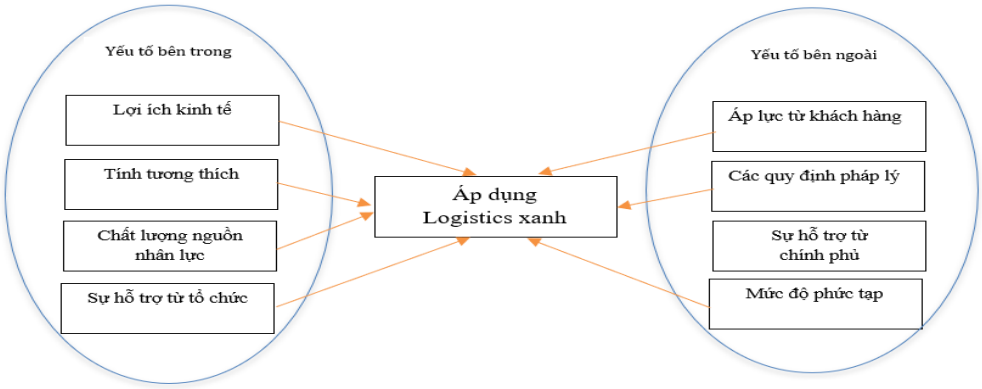
Các quy định pháp lý và chính sách môi trường có tác động lớn đến việc áp dụng logistics xanh. Theo Sarkis và cộng sự (2010), các quy định về giảm phát thải khí nhà kính và bảo vệ môi trường buộc các doanh nghiệp phải tuân thủ, và đây là yếu tố thúc đẩy việc áp dụng các giải pháp xanh trong logistics. Do vậy, nhóm tác giả có **giả thuyết H_7**: áp lực từ các quy định pháp lý và chính sách môi trường có ảnh hưởng đến việc áp dụng logistics xanh trong doanh nghiệp vận tải.

Chính phủ có thể đóng một vai trò quan trọng trong việc hỗ trợ các doanh nghiệp vận tải thông qua các chính sách ưu đãi, trợ cấp hoặc các chiến lược khuyến khích. Nghiên cứu của Zhu và cộng sự (2018), Ge & Liu (2019) đều cho thấy rằng sự hỗ trợ từ chính phủ giúp giảm chi phí triển khai các giải pháp logistics xanh, từ đó tạo ra động lực mạnh mẽ cho các doanh nghiệp trong việc áp dụng.

Do vậy, nhóm tác giả xây dựng **giả thuyết H_8**: sự hỗ trợ từ chính phủ, bao gồm các chính sách và ưu đãi, có tác động tích cực đến việc triển khai logistics xanh tại các doanh nghiệp vận tải hàng hóa đường bộ.

2.4. Mô hình nghiên cứu

Dựa trên các giả thuyết nghiên cứu trên, nhóm tác giả tiến hành xây dựng mô hình nghiên cứu về các yếu tố tác động đến việc áp dụng logistics xanh tại các doanh nghiệp vận tải đường bộ tại TP.HCM như sau:



(Nguồn: tác giả tổng hợp)

3. PHƯƠNG PHÁP NGHIÊN CỨU

3.1. Xây dựng thang đo nghiên cứu

Trong mô hình nghiên cứu có tất cả 8 yếu tố tác động đến áp dụng logistics xanh tại các đơn vị vận tải hàng hóa đường bộ tại TP.HCM gồm: (1) "Lợi ích kinh tế", (2) "Tính tương thích", (3) "Chất lượng nguồn nhân lực", (4) "Sự hỗ trợ từ tổ chức", (5) "Áp lực khách hàng", (6) "Các quy định pháp lý", (7) "Sự hỗ trợ từ chính phủ", (8) "Mức độ phức tạp". Thang đo của các yếu tố này đều đã được đề cập trong một số bài nghiên cứu liên quan mà nhóm tác giả đã trình bày ở mục 2.3.

Bảng 1: Tổng hợp nguồn của các thang đo đối với các khái niệm trong mô hình

Thang đo	Nguồn
Lợi ích kinh tế	Sarkis và cộng sự (2010)
Tính tương thích	Zhao và cộng sự (2016)
Chất lượng nguồn nhân lực	Bai và cộng sự (2019)
Sự hỗ trợ từ tổ chức	Chien và cộng (2014)
Áp lực khách hàng	Tate và cộng sự (2014)
Các quy định pháp lý	Sarkis và cộng sự (2010)
Sự hỗ trợ từ chính phủ	Ge & Liu (2019)
Mức độ phức tạp	Lee và cộng sự (2018)
Áp dụng Logistic xanh	Sureeyatanapas và cộng sự (2018)

(Nguồn: tác giả tổng hợp)

3.2. Thang đo các khái niệm trong mô hình nghiên cứu

Nhóm tác giả đã xây dựng một tập hợp thang đo (biến quan sát) để đo lường các khái niệm nghiên cứu. Trong mô hình nghiên cứu có 8 khái niệm liên quan, nhóm tác giả xây dựng 29 thang đo để đo lường các khái niệm này. Số lượng các thang đo (câu hỏi) cho từng khái niệm trong mô hình được trình bày chi tiết trong bảng 2 bên dưới.

Bảng 2: Số lượng thang đo (câu hỏi) cho các khái niệm trong mô hình nghiên cứu

Khái niệm	Số lượng thang đo	Khái niệm	Số lượng thang đo
Lợi ích kinh tế	3	Chất lượng nguồn nhân lực	3
Tính tương thích	4	Áp lực khách hàng	3
Mức độ phức tạp	3	Các quy định pháp lý	3
Hỗ trợ từ tổ chức	3	Sự hỗ trợ từ chính phủ	3
Áp dụng logistics xanh	4		

(Nguồn: tác giả tổng hợp)

3.3. Kích thước mẫu nghiên cứu

Kích thước mẫu cần thiết cho phương pháp PLS-SEM (Partial Least Squares Structural Equation Modeling) là một yếu tố quan trọng để đảm bảo kết quả phân tích có tính chính xác và tin cậy. Theo Green (2008) thì khi xây dựng mô hình hồi quy nếu muốn đánh giá các yếu tố của từng biến độc lập như kiểm định t, hệ số hồi quy … thì cỡ mẫu tối thiểu nên là 104 + m (m là số lượng biến độc lập). Trong đó, số biến độc lập là số lượng câu hỏi trong mô nghiên cứu nhân với số lượng thang đo trong từng câu hỏi. Trong bài nghiên cứu này, nhóm tác giả xây dựng 28 câu hỏi khảo sát, mỗi câu hỏi khảo sát được đo lường bằng thang đo Likert 5 mức. Do vậy, số lượng mẫu tối thiểu của nghiên cứu này phải là 244 quan sát theo đề xuất của Green (2008).

Sau khi gửi Bảng khảo sát và thu thập kết quả trả lời của các đáp viên, nhóm tác giả thu thập được 355 phiếu trả lời. Sau khi đánh giá nội dung của các phiếu trả lời, nhóm tác giả đã chọn lựa được 325 kết quả trả lời hợp lệ. Số lượng mẫu quan sát thu thập của bài nghiên cứu đáp ứng được các tiêu chuẩn về cỡ mẫu tối thiểu cho nghiên cứu đã đề cập ở trên.

3.4. Phương pháp phân tích dữ liệu

Nhóm tác giả sử dụng phương pháp hồi quy cấu trúc PLS-SEM. Đây là phương pháp được sử dụng rất phổ biến trong các nghiên cứu thực nghiệm lĩnh vực quản trị kinh doanh và marketing. Bởi vì, phương pháp hồi quy cấu trúc PLS-SEM cho phép kiểm định một tập hợp phương trình hồi quy cùng một lúc. Các mô hình nghiên cứu trong lĩnh vực quản trị kinh doanh và marketing thường có nhiều biến giải thích đồng thời có thể tác động lên biến phụ thuộc và các biến giải thích trong mô hình nghiên cứu lại có tác động lẫn nhau (Nguyễn Đình Thọ, 2013). Phương pháp hồi quy cấu trúc phối hợp được đồng thời các việc như hồi quy đa biến, phân tích nhân tố khẳng định (CFA – Confirmation factor Analysis) và phân tích mối liên kết giữa các phần tử trong mô hình.

4. Kết quả nghiên cứu, thảo luận và hàm ý quản trị

4.1 Kết quả nghiên cứu

Dữ liệu được thu thập từ Google Forms gửi đến các nhân viên thuộc doanh nghiệp hoạt động trong lĩnh vực vận tải hàng hoá đường bộ thông qua Viện nghiên cứu và phát triển logistics Việt Nam (VLI) kết quả thu được 325 mẫu hợp lệ.

Bảng 3: Thống kê nhân khẩu học các đối tượng trong mẫu dữ liệu khảo sát

Chỉ tiêu	Tỷ lệ	Chỉ tiêu	Tỷ lệ
Giới tính		**Loại hình doanh nghiệp**	
Nam	64%	Công ty TNHH	42,5%
Nữ	28,6%	Công ty có vốn đầu tư nước ngoài	14,8%
Khác	7,4%	Công ty có 100% vốn nhà nước	5,5%
Số năm kinh nghiệm		Doanh nghiệp tư nhân	37,2%
Từ 1 – 5 năm	5%	**Quy mô nhân sự doanh nghiệp**	

Từ 6 – 9 năm	32%	Dưới 50 nhân viên	20,3%
Từ 10 – 14 năm	50%	Từ 50 – 100 nhân viên	41,2%
Trên 15 năm	13%	Từ 100 – 200 nhân viên	20,3%
Vị trí công việc		Trên 200 nhân viên	18,2%
Nhân viên	38,3%		
Quản lý cấp trung	33,8%		
Quản lý	8,9%		
Giám đốc, điều hành	19%		

(Nguồn: kết quả tính toán từ mẫu dữ liệu quan sát)

Kết quả thống kê đặc điểm của các đối tượng được khảo sát trong Bảng 3 cho thấy 95% những người tham gia khảo sát có kinh nghiệm làm việc trong các doanh nghiệp vận tải đường bộ trên 5 năm. Mặt khác, 61,7% đối tượng được khảo sát là các quản lý từ cấp trung trở lên. Ngoài ra, quy mô về nhân sự của các doanh nghiệp nơi các đối tượng khảo sát cũng ở mức trung bình khá so với các doanh nghiệp logistics tại Việt Nam. Điều này đảm bảo tính chính xác và phù hợp của các kết quả khảo sát về các yếu tố tác động đến việc áp dụng logistics xanh tại các đơn vị vận tải đường bộ.

Bảng 4: Hệ số tác động của các yếu tố trong mô hình nghiên cứu

	Hệ số tác động	Độ lệch chuẩn	Mức ý nghĩa thống kê	Kết luận
Ap_luc_KH=>Logistics_xanh	0,097	0,027	0	Chấp nhận H_6
Ho_tro_CP => Logistics_xanh	0,301	0,032	0	Chấp nhận H_8
Ho_tro_TC => Logistics_xanh	0,116	0,033	0	Chấp nhận H_4
Loi_ich => Logistics_xanh	0,227	0,032	0	Chấp nhận H_1
Nhan su => Logistics_xanh	0,126	0,028	0	Chấp nhận H_5
Phuc_tap => Logistics_xanh	-0,192	0,027	0	Chấp nhận H_3
Quy_dinh_PL => Logistics_xanh	0,119	0,029	0	Chấp nhận H_7
Tuong_thich => Logistics_xanh	0.139	0,003	0	Chấp nhận H_2

(Nguồn: tổng hợp của tác giả từ kết quả phân tích mẫu dữ liệu)

Từ kết quả của Bảng 4 cho thấy ngoại trừ yếu tố "mức độ phức tạp" có tác động tiêu cực, các yếu tố còn lại trong mô hình nghiên cứu đều có tác động thúc đẩy việc áp dụng logistic xanh tại các doanh nghiệp vận tải đường bộ Tp.HCM.

4.2 Thảo luận kết quả và hàm ý quản trị

4.2.1 Lợi ích Kinh tế của logistics xanh

Kết quả nghiên cứu đã chỉ ra rằng việc áp dụng logistics xanh có thể đem lại những lợi ích kinh tế rõ rệt cho các doanh nghiệp. Kết quả này tương đồng với một số kết quả nghiên cứu trước đây về tác động của việc áp dụng logistics đến hiệu quả hoạt động của doanh nghiệp. Chẳng hạn, Gupta & Jain (2021) đã chỉ ra các lợi của việc áp dụng logistics xanh như: tiết kiệm chi phí qua việc tối ưu hóa các quy trình vận chuyển, giảm thiểu lượng khí thải CO_2 và tiết kiệm năng lượng nhờ vào việc sử dụng các công nghệ xanh như xe tải điện hoặc hệ thống quản lý vận tải thông minh. Hơn nữa, việc áp dụng logistics xanh cũng giúp các doanh nghiệp nâng cao hình ảnh thương hiệu, thu hút sự chú ý của khách hàng và đối tác, từ đó tạo ra cơ hội gia tăng doanh thu (Sarkis và cộng sự, 2010).

4.2.2 Tính tương thích với quy trình và quy định hiện tại của doanh nghiệp

Một trong những yếu tố quan trọng ảnh hưởng đến việc áp dụng logistics xanh là tính tương thích của các giải pháp

này với quy trình và quy định hiện tại của doanh nghiệp. Kết quả nghiên cứu cho thấy rằng các doanh nghiệp sẽ gặp phải sự kháng cự nếu việc áp dụng logistics xanh yêu cầu thay đổi quá nhiều trong quy trình hiện tại. Kết quả này đã được Wu & Dunn (2020) xác nhận. Các tác giả này đã cho thấy những công ty thành công trong việc triển khai logistics xanh thường thực hiện những đánh giá kỹ lưỡng các quy trình hiện có và tìm ra những điểm có thể tích hợp các giải pháp bền vững mà không làm gián đoạn hoạt động. Do vậy để áp dụng thành công logistcs xanh đòi hỏi doanh nghiệp đánh giá kỹ lưỡng về mức độ tương thích của công nghệ và quy trình mới với những quy trình truyền thống.

4.2.3 Mức độ phức tạp của các giải pháp logistics xanh

Kết quả nghiên cứu đã cho thấy mức độ phức tạp của các giải pháp logistics xanh có thể là một yếu tố gây cản trở đến khả năng áp dụng thành công trong doanh nghiệp. Các giải pháp xanh, như sử dụng các phương tiện vận chuyển điện hoặc các hệ thống giám sát khí thải, có thể đòi hỏi doanh nghiệp phải đầu tư vào công nghệ cao và cải thiện cơ sở hạ tầng. Điều này có thể tạo ra những khó khăn đối với các doanh nghiệp nhỏ và vừa, nơi mà chi phí đầu tư ban đầu có thể là một gánh nặng (Zhu và cộng sự, 2018). Mặt khác, các tập đoàn đa quốc cũng có thể gặp khó khăn trong việc chuẩn hóa và mở rộng các giải pháp logistics xanh trên quy mô toàn cầu (Lee và cộng sự, 2018). Do đó, các doanh nghiệp vận tải muốn áp dụng thành công logistics xanh cần phải chuẩn bị sẵn sàng với chiến lược giảm thiểu rủi ro và xây dựng các kế hoạch chuyển đổi không làm ảnh hưởng đến hoạt động.

4.2.4 Sự hỗ trợ từ ban lãnh đạo

Kết quả nghiên cứu đã cho thấy ban lãnh đạo doanh nghiệp đóng vai trò rất quan trọng trong việc áp dụng logistics xanh. Khi các nhà lãnh đạo cam kết và tích cực tham gia vào các sáng kiến bền vững, họ có thể đảm bảo việc cung cấp tài nguyên, thúc đẩy động lực cho nhân viên và tạo ra các chiến lược dài hạn cho sự phát triển bền vững (Kumar và cộng sự, 2020). Những công ty có sự hỗ trợ mạnh mẽ từ ban lãnh đạo trong việc đầu tư vào công nghệ xanh hoặc áp dụng các chính sách giảm thiểu carbon thường sẽ đạt được thành công trong việc triển khai logistics xanh (Chien và cộng, 2014). Vì vậy, lãnh đạo các doanh nghiệp vận tải đường bộ cần phải có chiến lược rõ ràng và truyền tải tầm quan trọng của việc thực hiện logistics xanh đối với toàn thể tổ chức.

4.2.5 Chất lượng nguồn nhân lực

Kết quả nghiên cứu cũng cho thấy chất lượng nguồn nhân lực cũng là một yếu tố không thể bỏ qua trong việc áp dụng logistics xanh. Các doanh nghiệp có đội ngũ nhân viên có trình độ cao và hiểu biết về môi trường sẽ dễ dàng triển khai các giải pháp logistics xanh hiệu quả hơn (Wang & Zhang, 2019). Vì vậy, việc đào tạo và phát triển kỹ năng chuyên môn về quản lý chuỗi cung ứng xanh là yếu tố quyết định để triển khai thành công logistics xanh.

4.2.6 Quy định môi trường

Bài nghiên cứu đã giúp khẳng định rằng các quy định về môi trường có tác động trực tiếp đến việc áp dụng logistics xanh tại các doanh nghiệp. Nhiều quốc gia và khu vực, đặc biệt là Liên minh Châu Âu, đã áp dụng các quy định nghiêm ngặt về khí thải và tiết kiệm năng lượng, buộc các doanh nghiệp phải thực hiện các biện pháp bảo vệ môi trường trong quá trình vận hành. Các quy định này có thể là động lực để các doanh nghiệp chuyển sang các giải pháp logistics xanh nhằm tuân thủ các yêu cầu của chính phủ và tránh các khoản phạt (Giovanni & Fabbri, 2021).

4.2.7 Áp lực từ khách hàng

Áp lực từ khách hàng cũng là một yếu tố quan trọng thúc đẩy doanh nghiệp áp dụng logistics xanh. Nghiên cứu cho thấy rằng khách hàng ngày càng có yêu cầu cao đối với việc cung cấp sản phẩm và dịch vụ bền vững. Các công ty có thể tạo ra lợi thế cạnh tranh đáng kể nếu đáp ứng nhu cầu này, chẳng hạn như bằng cách sử dụng bao bì thân thiện với môi trường hoặc giảm thiểu lượng khí thải trong vận chuyển (Yildirim et al., 2019).

4.2.8 Sự hỗ trợ từ chính phủ

Kết quả nghiên cứu đã cho thấy Chính phủ đóng vai trò quan trọng trong việc thúc đẩy việc áp dụng logistics xanh thông qua các chính sách hỗ trợ như giảm thuế, cấp tín dụng hoặc hỗ trợ tài chính cho các sáng kiến xanh. Những chính sách này giúp giảm gánh nặng tài chính cho các doanh nghiệp, khuyến khích các doanh nghiệp vận tải đường bộ đầu tư vào công nghệ và các phương tiện vận chuyển thân thiện với môi trường (Bergin & Collings, 2020). Bên cạnh đó, các doanh nghiệp cần xây dựng chiến lược tài chính hợp lý để tận dụng tối đa các lợi ích từ việc giảm thuế, nhận các khoản hỗ trợ từ chính phủ hoặc các tổ chức quốc tế để áp dụng logistics xanh.

5. KẾT LUẬN

Việc áp dụng logistics xanh là một bước đi quan trọng và có ý nghĩa đối với các doanh nghiệp vận tải đường bộ tại Tp.HCM trong bối cảnh hiện nay. Các yếu tố như lợi ích kinh tế, tính tương thích với quy trình hiện tại, sự hỗ trợ từ ban lãnh đạo, chất lượng nguồn nhân lực và các yếu tố bên ngoài như quy định môi trường, áp lực từ khách hàng và sự hỗ trợ của chính phủ đều có ảnh hưởng sâu sắc đến việc triển khai các giải pháp logistics xanh. Các nhà quản trị doanh nghiệp cần nhận thức rõ về các kể trên và phải chuẩn bị một chiến lược chi tiết để đối phó với từng yếu tố này. Đặc biệt, việc nâng cao nhận thức và đào tạo nhân lực, đảm bảo sự hỗ trợ từ lãnh đạo cấp cao, và tuân thủ các quy định môi trường là những yếu tố then chốt giúp doanh nghiệp không chỉ giảm chi phí mà còn nâng cao giá trị thương hiệu trong mắt khách hàng. Mặt khác, các doanh nghiệp nên tăng cường hợp tác với các đối tác bên ngoài, như nhà cung cấp công nghệ xanh hoặc các tổ chức môi trường, để phát triển những giải pháp logistics xanh bền vững, tiết kiệm chi phí nhất và phù hợp với đặc điểm, quy trình kinh doanh hiện tại của doanh nghiệp.

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CÁC YẾU TỐ ẢNH HƯỞNG ĐẾN NET ZERO TRONG DU LỊCH HƯỚNG ĐẾN PHÁT TRIỂN BỀN VỮNG

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TÓM TẮT

Nghiên cứu này điều tra các yếu tố ảnh hưởng đến việc đạt được mục tiêu Net Zero trong ngành du lịch Việt Nam, tập trung vào các doanh nghiệp hoạt động tại Thành phố Hồ Chí Minh và các khu vực lân cận. Sử dụng phương pháp tiếp cận hỗn hợp, dữ liệu được thu thập từ tháng 10 đến tháng 12 năm 2024 thông qua phương pháp lấy mẫu ngẫu nhiên phân tầng, bao gồm khảo sát định lượng 180 người tham gia ngành du lịch và phỏng vấn chuyên sâu 20 chuyên gia trong ngành. Mô hình nghiên cứu xem xét năm biến độc lập: áp dụng công nghệ xanh, đầu tư năng lượng tái tạo, thực hành quản lý chất thải, tham gia du lịch sinh thái và các nguyên tắc kinh tế tuần hoàn, với thành tích Net Zero là biến phụ thuộc.

Phân tích dữ liệu định lượng được thực hiện bằng SPSS, kết hợp thống kê mô tả, kiểm tra độ tin cậy, phân tích nhân tố khám phá (EFA) và phân tích hồi quy bội để đánh giá mối quan hệ giữa các biến. Dữ liệu định tính từ các cuộc phỏng vấn chuyên gia cung cấp thêm thông tin chi tiết về những thách thức và cơ hội thực hiện du lịch bền vững.

Các phát hiện chỉ ra rằng đầu tư năng lượng tái tạo và các nguyên tắc kinh tế tuần hoàn có tác động đáng kể nhất đến việc đạt được mục tiêu phát thải ròng bằng không. Nghiên cứu này mở rộng hiểu biết lý thuyết bằng cách xác thực một mô hình tích hợp các khuôn khổ bền vững về môi trường vào hoạt động du lịch. Trên thực tế, các kết quả đưa ra các khuyến nghị có thể thực hiện được cho các nhà hoạch định chính sách và lãnh đạo doanh nghiệp để thiết kế các chiến lược phát triển bền vững có mục tiêu, bao gồm các ưu đãi tài chính cho các dự án năng lượng tái tạo và các quy định chặt chẽ hơn về môi trường. Bằng cách nêu bật các động lực chính của mục tiêu phát thải ròng bằng không trong ngành du lịch của Việt Nam, nghiên cứu này đóng góp vào các cuộc thảo luận toàn cầu về du lịch bền vững và hành động vì khí hậu.

Từ khóa : Biến đổi khí hậu, Công nghệ xanh, Du lịch bền vững, Kinh tế tuần hoàn, Net Zero

1. GIỚI THIỆU

Ngành du lịch là động lực kinh tế toàn cầu chính, đóng góp khoảng 8% lượng khí thải carbon toàn cầu, trong đó giao thông, chỗ ở và các hoạt động giải trí là những nguồn chính (UNWTO, 2023). Khi tính bền vững trở thành mối quan tâm cấp bách, các chính phủ và doanh nghiệp trên toàn thế giới đang cam kết đạt mục tiêu Net Zero để giảm thiểu tác động môi trường của du lịch. Tuy nhiên, con đường hướng đến mục tiêu Net Zero trong du lịch vẫn còn nhiều thách thức do những hạn chế về tài chính, hạn chế về công nghệ và sự không nhất quán về chính sách.

Tại Việt Nam, du lịch đóng vai trò quan trọng trong phát triển kinh tế, đóng góp gần 9,2% GDP vào năm 2019 (Tổng cục Du lịch Việt Nam, 2023). Mặc dù có những lợi ích kinh tế, ngành này vẫn phải đối mặt với áp lực ngày càng tăng trong việc giảm dấu chân môi trường và phù hợp với các mục tiêu phát triển bền vững toàn cầu. Những nỗ lực hiện tại, chẳng hạn như áp dụng các chứng nhận sinh thái và chương trình bù đắp carbon, đã mang lại thành công hạn chế do việc thực thi quy định không nhất quán và mức độ cam kết khác nhau của ngành. Có một nhu cầu cấp thiết về một cách tiếp cận dựa trên bằng chứng để xác định các yếu tố chính ảnh hưởng đến việc đạt được Mục tiêu phát thải ròng bằng 0 trong du lịch và xây dựng các chiến lược có mục tiêu để thực hiện hiệu quả.

Nghiên cứu này nhằm mục đích giải quyết khoảng cách này bằng cách điều tra năm yếu tố chính ảnh hưởng đến tiến trình của ngành du lịch hướng tới mục tiêu Phát thải ròng bằng 0: áp dụng công nghệ xanh, đầu tư năng lượng tái tạo, thực hành quản lý chất thải, tham gia du lịch sinh thái và các nguyên tắc kinh tế tuần hoàn. Các yếu tố này được lựa chọn dựa trên các khuôn khổ phát triển bền vững hiện có và tiềm năng đã được chứng minh của chúng trong việc giảm phát thải trong các hoạt động liên quan đến du lịch.

Mục tiêu nghiên cứu tổng quát của nghiên cứu này là những yếu tố chính ảnh hưởng đến việc đạt được mục tiêu phát thải ròng bằng 0 trong ngành du lịch Việt Nam.

Mục tiêu nghiên cứu cụ thể bao gồm:

– Những đổi mới công nghệ, chẳng hạn như công nghệ xanh và năng lượng tái tạo, tác động như thế nào đến tiến trình Phát thải ròng bằng 0?

– Nguyên tắc quản lý chất thải bền vững và kinh tế tuần hoàn đóng vai trò gì trong việc giảm phát thải?

– Du lịch sinh thái đóng góp như thế nào vào quá trình chuyển đổi hướng tới mục tiêu phát thải ròng bằng 0 trong ngành du lịch Việt Nam?

Bằng cách trả lời những câu hỏi này, nghiên cứu này góp phần vào sự hiểu biết cả về mặt lý thuyết và thực tiễn về thành tựu Net Zero trong du lịch. Về mặt lý thuyết, nghiên cứu này tích hợp các lý thuyết về tính bền vững của môi trường với các nguyên tắc quản lý du lịch, đưa ra một khuôn khổ để hiểu về việc thực hiện Net Zero. Về mặt thực tiễn, các phát hiện cung cấp cho các nhà hoạch định chính sách và lãnh đạo doanh nghiệp các khuyến nghị dựa trên bằng chứng để thiết kế các sáng kiến bền vững, chẳng hạn như các ưu đãi chính sách cho việc áp dụng năng lượng tái tạo và các quy định chặt chẽ hơn về môi trường đối với quản lý chất thải.

Mặc dù nhận thức ngày càng tăng về các chiến lược Net Zero trong du lịch, vẫn còn hạn chế nghiên cứu về tác động kết hợp của công nghệ xanh, năng lượng tái tạo, quản lý chất thải, kinh tế tuần hoàn và du lịch sinh thái trong việc đạt được các mục tiêu Net Zero. Nghiên cứu này thu hẹp khoảng cách này bằng cách xây dựng một khuôn khổ tích hợp lý thuyết chuyển đổi bền vững, lý thuyết áp dụng đổi mới và lý thuyết thay đổi thể chế để giải thích cách các yếu tố này cùng nhau đóng góp vào thành tích Net Zero trong du lịch.

2. TỔNG QUAN TÌNH HÌNH NGHIÊN CỨU VÀ KHUNG LÝ THUYẾT

2.1. Cơ sở lý luận và khung phương pháp đo lường

Trong bối cảnh ngành du lịch ngày càng nhận thức rõ về các tác động môi trường và nhu cầu giảm thiểu lượng phát thải carbon, việc triển khai mô hình phát thải ròng bằng 0 (Net Zero) đã trở thành mục tiêu quan trọng của nhiều doanh nghiệp và quốc gia. Các nghiên cứu về du lịch bền vững đã chỉ ra rằng, việc áp dụng các công nghệ xanh, đầu tư vào năng lượng tái tạo, cải thiện quản lý chất thải, và tham gia vào du lịch sinh thái không chỉ giúp giảm thiểu tác động môi trường mà còn đóng góp vào quá trình chuyển đổi bền vững của ngành du lịch (Becken & Higham, 2023; Hall, 2022). Bên cạnh đó, các nguyên tắc kinh tế tuần hoàn cũng được cho là một yếu tố quan trọng trong việc đạt được các mục tiêu này, khi mà việc tái sử dụng tài nguyên và giảm thiểu chất thải giúp nâng cao hiệu quả sử dụng nguồn lực, từ đó giảm thiểu dấu chân carbon (Miller & Johnson, 2023).

Khung lý thuyết của nghiên cứu này được xây dựng dựa trên ba lý thuyết chính: Lý thuyết chuyển đổi bền vững, Lý thuyết áp dụng đổi mới và Lý thuyết thay đổi thể chế. Trong đó, lý thuyết chuyển đổi bền vững nhấn mạnh vào việc thay đổi sâu sắc các mô hình hoạt động và tiêu thụ để đạt được mục tiêu phát triển bền vững trong dài hạn. Lý thuyết áp dụng đổi mới lý giải rằng việc áp dụng các công nghệ và phương thức mới sẽ thúc đẩy quá trình chuyển đổi này, trong khi lý thuyết thay đổi thể chế cho thấy tầm quan trọng của các thay đổi trong chính sách và thể chế đối với việc triển khai các chiến lược bền vững.

Với khung lý thuyết này, nghiên cứu đã xác định và điều chỉnh các thang đo từ các nghiên cứu trước đó, đồng thời phát triển một mô hình đo lường mới cho các yếu tố ảnh hưởng đến việc đạt được Net Zero trong ngành du lịch Việt Nam. Các yếu tố được lựa chọn bao gồm: áp dụng công nghệ xanh, đầu tư năng lượng tái tạo, thực hành quản lý chất thải, tham gia du lịch sinh thái và áp dụng các nguyên tắc kinh tế tuần hoàn. Mỗi yếu tố này không chỉ có cơ sở lý luận vững chắc mà còn được kiểm chứng qua các nghiên cứu điển hình trong ngành.

Phương pháp đo lường được sử dụng trong nghiên cứu này kết hợp giữa các thang đo định lượng và định tính, giúp đánh giá một cách toàn diện các yếu tố này. Các thang đo định lượng được phát triển từ các công trình nghiên cứu trước (Sun & Kim, 2022; Zhang & Wall, 2023) và được điều chỉnh sao cho phù hợp với đặc thù của ngành du lịch tại Việt Nam. Các công cụ đo lường này được kiểm định tính hợp lệ và độ tin cậy thông qua các phân tích nhân tố khám phá (EFA) và phân tích nhân tố xác nhận (CFA), với mục tiêu đảm bảo rằng các chỉ số đo lường phản ánh đúng các yếu tố nghiên cứu.

Trong nghiên cứu này, phương pháp đo lường không chỉ đảm bảo tính chính xác và khả năng tổng quát của các yếu tố ảnh hưởng mà còn giúp xác định được các mối quan hệ giữa chúng và mức độ ảnh hưởng của từng yếu tố đến kết quả đạt được mục tiêu Net Zero. Cụ thể, các biến số liên quan đến công nghệ xanh, năng lượng tái tạo, quản lý chất thải, du

lịch sinh thái và kinh tế tuần hoàn sẽ được đo lường thông qua các câu hỏi khảo sát dạng Likert, giúp thu thập dữ liệu một cách chi tiết và có thể kiểm tra lại được.

2.2. Thành tựu phát thải ròng bằng 0 trong du lịch

Các cam kết toàn cầu gần đây, chẳng hạn như Hướng dẫn Net Zero 2024 của UNWTO, nhấn mạnh nhu cầu các doanh nghiệp du lịch chuyển đổi sang hoạt động bền vững. Các nghiên cứu trước đây đã khám phá những nỗ lực phát triển bền vững chung trong du lịch (Becken & Higham, 2023; Gössling & Scott, 2023), nhưng ít nghiên cứu nào tập trung vào các động lực cụ thể để đạt được mục tiêu Net Zero. Nghiên cứu này xây dựng dựa trên các nghiên cứu trước đây bằng cách tích hợp các hiểu biết cập nhật về ngành và các nghiên cứu điển hình về các điểm đến du lịch triển khai các chiến lược Net Zero.

2.3. Các yếu tố ảnh hưởng đến việc đạt được mục tiêu phát thải ròng bằng 0

2.3.1. Công nghệ xanh và áp dụng năng lượng tái tạo

Các doanh nghiệp du lịch ngày càng áp dụng các công nghệ xây dựng thông minh, các giải pháp tiết kiệm năng lượng và các nguồn năng lượng tái tạo để giảm lượng khí thải carbon (Lee và cộng sự, 2023). Việc tích hợp các công nghệ này phù hợp với lý thuyết chuyển đổi bền vững, trong đó nhấn mạnh vai trò của những tiến bộ công nghệ trong quá trình chuyển đổi bền vững trên toàn ngành. Do đó: *H1. Việc áp dụng công nghệ xanh có tác động tích cực đến mục tiêu phát thải ròng bằng 0 trong du lịch.*

2.3.2 Đầu tư vào năng lượng tái tạo

Đầu tư vào năng lượng tái tạo là con đường cơ bản để đạt được mục tiêu Net Zero trong du lịch. Một nghiên cứu toàn diện của Sustainable Tourism Partnership (2023) cho thấy các cơ sở du lịch sử dụng năng lượng tái tạo đã giảm lượng khí thải carbon tới 60%. Phát hiện này được hỗ trợ bởi nghiên cứu của Sun và Kim (2022) cho thấy mối tương quan mạnh mẽ giữa việc áp dụng năng lượng tái tạo và giảm phát thải trong lĩnh vực khách sạn. Do đó: *H2. Đầu tư vào năng lượng tái tạo có tác động tích cực đến mục tiêu phát thải ròng bằng 0 trong du lịch.*

2.3.3 Thực hành quản lý chất thải

Quản lý chất thải hiệu quả đã được xác định là yếu tố quan trọng để đạt được mục tiêu Net Zero. Nghiên cứu của Thompson và cộng sự (2023) đã chứng minh rằng các khách sạn triển khai hệ thống quản lý chất thải toàn diện đã giảm 25% lượng khí thải carbon. Ngoài ra, Rico và Martinez (2022) phát hiện ra rằng các hoạt động quản lý chất thải phù hợp góp phần đáng kể vào việc giảm tác động môi trường trong hoạt động du lịch. Do đó: *H3. Các biện pháp quản lý chất thải tiên tiến có tác động tích cực đến mục tiêu phát thải ròng bằng 0 trong du lịch.*

2.3.4 Tham gia du lịch sinh thái

Đánh giá sâu rộng của Buckley (2023) về các hoạt động du lịch sinh thái cho thấy các điểm đến tích cực tham gia vào các sáng kiến du lịch sinh thái đã cho thấy tiến triển tốt hơn hướng tới các mục tiêu Net Zero. Phát hiện này được Chen và Wong (2022) ủng hộ, họ đã ghi nhận mức giảm phát thải đáng kể trong các hoạt động du lịch được chứng nhận sinh thái. Do đó: *H4. Tham gia du lịch sinh thái có tác động tích cực đến mục tiêu phát thải ròng bằng 0 trong du lịch.*

2.3.5 Nguyên tắc kinh tế tuần hoàn

Việc áp dụng các nguyên tắc kinh tế tuần hoàn đã cho thấy kết quả khả quan trong việc đạt được các mục tiêu Net Zero. Nghiên cứu của Miller và Johnson (2023) chứng minh rằng các doanh nghiệp du lịch áp dụng các hoạt động kinh tế tuần hoàn đã giảm được 40% mức tiêu thụ tài nguyên. Những phát hiện này phù hợp với nghiên cứu của Hall (2022) cho thấy tác động tích cực của việc áp dụng kinh tế tuần hoàn đối với tính bền vững của môi trường trong du lịch. Do đó: *H5. Việc áp dụng các nguyên tắc kinh tế tuần hoàn có tác động tích cực đến mục tiêu phát thải ròng bằng 0 trong du lịch.*

3. PHƯƠNG PHÁP NGHIÊN CỨU

3.1. Thiết kế nghiên cứu và lý giải

Nghiên cứu này sử dụng phương pháp tiếp cận hỗn hợp, kết hợp nghiên cứu định lượng và định tính để cung cấp hiểu biết toàn diện về các yếu tố ảnh hưởng đến thành tích Net Zero trong du lịch. Thiết kế hỗn hợp được biện minh bởi khả năng tam giác hóa các phát hiện, tăng cường tính hợp lệ của kết quả và cung cấp những hiểu biết sâu sắc mà một phương pháp đơn lẻ không thể đạt được. Thành phần định lượng đánh giá các mối quan hệ thống kê giữa các yếu tố chính,

trong khi thành phần định tính cung cấp những hiểu biết theo ngữ cảnh từ các chuyên gia trong ngành.

3.2. Chiến lược thu thập dữ liệu và lấy mẫu

Việc thu thập dữ liệu diễn ra từ tháng 10 đến tháng 12 năm 2024 bằng cách sử dụng khảo sát bảng câu hỏi có cấu trúc và phỏng vấn bán cấu trúc. Một kỹ thuật lấy mẫu ngẫu nhiên phân tầng đã được áp dụng để đảm bảo phạm vi đại diện cho nhiều doanh nghiệp du lịch khác nhau, bao gồm khách sạn, công ty lữ hành và doanh nghiệp du lịch sinh thái. Quy mô mẫu là 180 được xác định bằng cách sử dụng phân tích năng lực, đảm bảo độ tin cậy về mặt thống kê (Cohen, 1992). Tỷ lệ phản hồi là 72%, với sai lệch không phản hồi được đánh giá thông qua so sánh người trả lời muộn so với sớm.

Đối với phân tích định tính, 20 chuyên gia đã được lựa chọn bằng cách lấy mẫu có chủ đích, nhắm mục tiêu đến các nhà quản lý phát triển bền vững, nhà hoạch định chính sách và nhà nghiên cứu có ít nhất năm năm kinh nghiệm trong lĩnh vực du lịch bền vững. Tiêu chí lựa chọn chuyên gia bao gồm đóng góp học thuật, kinh nghiệm chuyên môn trong các sáng kiến Net Zero và khả năng lãnh đạo trong các dự án du lịch bền vững.

3.3. Phát triển phép đo và kiểm tra tính hợp lệ

Các thang đo được điều chỉnh từ các nghiên cứu đã thiết lập (Zhang & Wall, 2023; Sun & Kim, 2022). Thang đo Likert năm điểm được sử dụng cho tất cả các cấu trúc, với tính hợp lệ được đánh giá thông qua phân tích nhân tố khám phá (EFA). Tính hợp lệ của cấu trúc được kiểm tra thêm bằng phân tích nhân tố xác nhận (CFA) và độ tin cậy được đảm bảo bằng hệ số alpha của Cronbach (ngưỡng > 0,7). Một thử nghiệm thí điểm đã được tiến hành với 30 người trả lời để tinh chỉnh bảng câu hỏi về tính rõ ràng và độ tin cậy.

Các mục mẫu trong bảng câu hỏi bao gồm:

- Áp dụng công nghệ xanh: "Doanh nghiệp của chúng tôi đã triển khai hệ thống quản lý năng lượng thông minh."
- Đầu tư năng lượng tái tạo: "Chúng tôi phân bổ nguồn lực đáng kể cho việc áp dụng năng lượng mặt trời hoặc năng lượng gió."
- Thực hành quản lý chất thải: "Chúng tôi có chương trình tái chế chất thải có cấu trúc."
- Tham gia du lịch sinh thái: "Công ty chúng tôi cung cấp các trải nghiệm du lịch sinh thái được chứng nhận."
- Nguyên tắc kinh tế tuần hoàn: "Chúng tôi ưu tiên tái sử dụng tài nguyên và chuỗi cung ứng bền vững."
- Thành tựu về mức phát thải ròng bằng 0: "Chúng tôi có mục tiêu trung hòa carbon rõ ràng và cơ chế giám sát."

3.4. Giao thức phỏng vấn và phân tích định tính

Các cuộc phỏng vấn tuân theo một giao thức có cấu trúc bao gồm năm lĩnh vực chủ đề phù hợp với mô hình nghiên cứu. Mỗi cuộc phỏng vấn kéo dài khoảng 45–60 phút và được ghi lại với sự đồng ý của người tham gia. Phân tích chủ đề được thực hiện bằng NVivo, xác định các mô hình và chủ đề mới nổi từ các câu chuyện của chuyên gia. Mã hóa được thực hiện trong hai vòng: mã hóa mở để xác định các danh mục rộng và mã hóa trục để thiết lập mối quan hệ giữa các chủ đề.

3.5. Kỹ thuật phân tích dữ liệu và giảm thiểu sai lệch

Phân tích định lượng tuân theo phương pháp có cấu trúc:

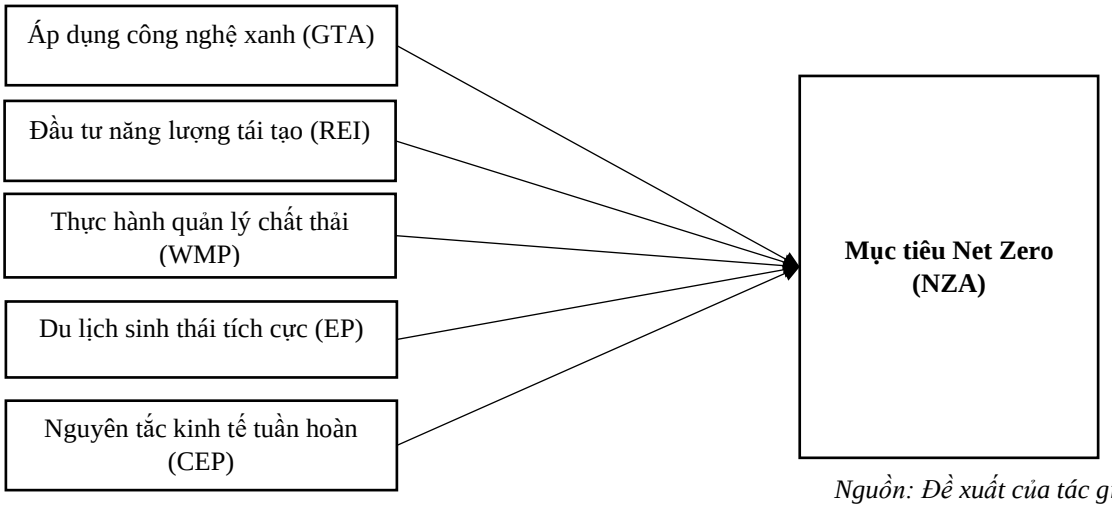
- Thống kê mô tả để tóm tắt đặc điểm mẫu.
- Phân tích độ tin cậy sử dụng hệ số alpha của Cronbach để đánh giá tính nhất quán nội bộ.
- Phân tích nhân tố khám phá (EFA) để đánh giá tính hợp lệ của cấu trúc.
- Phân tích hồi quy bội để kiểm tra các giả thuyết và mối quan hệ.

Để giảm thiểu sai lệch, phương sai phương pháp chung (CMV) đã được kiểm tra bằng cách sử dụng thử nghiệm một yếu tố của Harman, đảm bảo rằng không có yếu tố đơn lẻ nào giải thích được hầu hết phương sai. Dữ liệu bị thiếu được xử lý bằng nhiều kỹ thuật quy imputation. Đối với dữ liệu định tính, phép tam giác hóa nghiên cứu được áp dụng để tăng cường độ tin cậy.

Bằng cách tích hợp các phương pháp định lượng và định tính chặt chẽ, nghiên cứu này đảm bảo tính chắc chắn trong việc xác định các động lực chính để đạt được mục tiêu phát thải ròng bằng 0 trong ngành du lịch Việt Nam.

Mô hình hồi quy được xác định như sau:

Hình 1: Mô hình nghiên cứu



Nguồn: Đề xuất của tác giả, 2025

$NZA = \beta_0 + \beta_1 GTA + \beta_2 REI + \beta_3 WMP + \beta_4 EP + \beta_5 CEP + \varepsilon$, trong đó NZA đại diện cho Thành tích ròng bằng 0 và các biến độc lập tương ứng với năm yếu tố đang được điều tra.

4. KẾT QUẢ NGHIÊN CỨU VÀ THẢO LUẬN

4.1. Thống kê mô tả và phân tích tương quan

Bảng 1: Đặc điểm của tổ chức và người trả lời

Đặc điểm	Loại	Tính thường xuyên	Phần trăm (%)
Vị trí của người trả lời	Tổng giám đốc điều hành/Tổng giám đốc	45	25.0
	Quản lý phát triển bền vững	62	34,4
	Quản lý điều hành	48	26,7
	Các nhà quản lý cấp cao khác	25	13.9
Loại hình tổ chức	Khách sạn & Khu nghỉ dưỡng	65	36,1
	Nhà điều hành tour du lịch	45	25.0
	Điểm tham quan du lịch	32	17.8
	Vận tải	28	15,6
	Khác	10	5,5
Quy mô tổ chức	Nhỏ (<50)	42	23.3
	Trung bình (50-250)	85	47,2
	Lớn (>250)	53	29,4
Năm hoạt động	< 5 năm	25	13.9
	5-10 năm	58	32,2
	11-20 tuổi	62	34,4
	> 20 năm	35	19.4
Chứng nhận tính bền vững	Đúng	132	73,3
	KHÔNG	48	26,7

Nguồn: Tác giả phân tích dữ liệu khảo sát

Bảng 1 trình bày các đặc điểm của các tổ chức được khảo sát và đại diện của họ. Hầu hết những người trả lời đều ở các vị trí quản lý cấp cao, với Quản lý Phát triển Bền vững (34,4%) tạo thành nhóm lớn nhất, tiếp theo là Quản lý Hoạt động (26,7%) và Tổng giám đốc điều hành/Tổng giám đốc (25,0%). Khách sạn và khu nghỉ dưỡng đại diện cho lĩnh vực lớn nhất (36,1%) và hầu hết các tổ chức là doanh nghiệp vừa (47,2%). Hơn một nửa số tổ chức (53,8%) đã hoạt động trong hơn 10 năm và phần lớn đáng kể (73,3%) có chứng nhận phát triển bền vững, cho thấy một mẫu trưởng thành với các cam kết mạnh mẽ về môi trường.

4.2. Kết quả phân tích độ tin cậy

Độ tin cậy của thang đo được đánh giá bằng hệ số Cronbach's Alpha. Theo Hair và cộng sự (2022), thang đo có giá trị Cronbach's Alpha lớn hơn 0,7 được coi là đáng tin cậy. Bảng 2 trình bày kết quả phân tích độ tin cậy cho tất cả các cấu trúc được sử dụng trong nghiên cứu này.

Bảng 2: Kết quả phân tích độ tin cậy của thang đo

Xây dựng	Số lượng mặt hàng	Alpha của Cronbach	Phạm vi tương quan mục-tổng
Áp dụng công nghệ xanh (GTA)	5	0,875	0,682 - 0,841
Đầu tư năng lượng tái tạo (REI)	4	0,893	0,715 - 0,858
Thực hành quản lý chất thải (WMP)	4	0,862	0,694 - 0,825
Tham gia du lịch sinh thái (EP)	5	0,881	0,701 - 0,834
Nguyên tắc kinh tế tuần hoàn (CEP)	5	0,896	0,728 - 0,863
Thành tựu phát thải ròng bằng 0 (NZA)	6	0,908	0,745 - 0,872

Nguồn: Tác giả phân tích dữ liệu khảo sát

Kết quả phân tích độ tin cậy cho thấy tất cả các thang đo đều thể hiện tính nhất quán nội bộ tốt. Giá trị Cronbach's Alpha dao động từ 0,862 đến 0,908, cao hơn nhiều so với ngưỡng khuyến nghị là 0,7. Hệ số tương quan tổng mục cho tất cả các mục đều trên 0,6, cho thấy mối quan hệ chặt chẽ giữa các mục riêng lẻ và thang đo tương ứng của chúng. Những kết quả này cho thấy các công cụ đo lường được sử dụng trong nghiên cứu này là đáng tin cậy và phù hợp để phân tích thêm.

4.3. Kết quả phân tích nhân tố khám phá

Phân tích nhân tố khám phá (EFA) được thực hiện bằng cách sử dụng Phân tích thành phần chính với phép xoay Varimax để kiểm tra tính hợp lệ của cấu trúc thang đo. Trước khi thực hiện EFA, thước đo Kaiser-Meyer-Olkin (KMO) về tính đầy đủ của mẫu và kiểm định Bartlett về tính cầu đã được đánh giá để đảm bảo tính phù hợp của dữ liệu cho phân tích nhân tố.

Bảng 3: Kết quả thử nghiệm KMO và Bartlett

Bài kiểm tra	Giá trị
Biện pháp Kaiser-Meyer-Olkin	0,893
Kiểm tra tính hình cầu của Bartlett (Chi-square)	3.245.672
Các mức độ tự do	435
Ý nghĩa	0,000

Nguồn: Tác giả phân tích dữ liệu khảo sát

Bảng 4: Kết quả EFA - Ma trận thành phần xoay

Mặt hàng	(GTA)	(REI)	(WMP)	(Tập)	(CEP)
GTA1	0,845				
GTA2	0,832				
GTA3	0,818				
GTA4	0,806				
GTA5	0,792				
REI1		0,856			
REI2		0,841			
REI3		0,828			

REI4	0,815			
WMP1		0,834		
WMP2		0,822		
WMP3		0,808		
WMP4		0,795		
Tập 1			0,848	
Tập 2			0,835	
Tập 3			0,821	
Tập 4			0,809	
Tập 5			0,792	
CEP1				0,862
CEP2				0,845
CEP3				0,831
CEP4				0,818
CEP5				0,804

Nguồn: Phân tích dữ liệu khảo sát

Kết quả EFA chứng minh tính hợp lệ cấu trúc mạnh của các thang đo. Giá trị KMO là 0,893 và kiểm định Bartlett có ý nghĩa ($p < 0,001$) xác nhận tính phù hợp của dữ liệu đối với phân tích nhân tố. Năm nhân tố riêng biệt xuất hiện, giải thích 75,62% tổng phương sai, với tải nhân tố dao động từ 0,792 đến 0,862 và không có tải chéo đáng kể. Những phát hiện này hỗ trợ cấu trúc năm nhân tố được đề xuất của khuôn khổ lý thuyết.

4.4. Kết quả phân tích tương quan

Phân tích tương quan Pearson được tiến hành để kiểm tra mối quan hệ giữa các biến và kiểm tra các vấn đề đa cộng tuyến tiềm ẩn. Bảng 5 trình bày thống kê mô tả và ma trận tương quan cho tất cả các biến. Giá trị trung bình biểu thị mức độ đồng thuận chung với từng cấu trúc, trong khi độ lệch chuẩn làm nổi bật tính biến thiên của phản ứng. Giá trị alpha của Cronbach xác nhận tính nhất quán nội tại của tất cả các thang đo ($\alpha > 0,7$). Phân tích tương quan cho thấy mối quan hệ tích cực đáng kể giữa tất cả các biến độc lập và biến phụ thuộc (Thành tựu ròng bằng không). Đa cộng tuyến được đánh giá bằng cách sử dụng các giá trị Hệ số lạm phát phương sai (VIF), tất cả đều dưới 3,0, cho thấy không có mối lo ngại nghiêm trọng nào về đa cộng tuyến.

Bảng 5: Thống kê mô tả và Ma trận tương quan

Biến số	Nghĩa là	Thẻ: SD	GTA	REI	WMP	Tập	CEP	NZA
GTA	3.82	0,74	1					
REI	3,65	0,82	0,485**	1				
WMP	3,94	0,68	0,412**	0,438**	1			
Tập	3,78	0,71	0,395**	0,428**	0,445**	1		
CEP	3.71	0,76	0,442**	0,468**	0,432**	0,415**	1	
NZA	3,58	0,85	0,512**	0,624**	0,508**	0,485**	0,558**	1

Nguồn: Tác giả phân tích dữ liệu khảo sát

Phân tích tương quan cho thấy tất cả các biến độc lập (GTA, REI, WMP, EP và CEP) đều có tương quan dương đáng kể với biến phụ thuộc (NZA), với hệ số dao động từ 0,485 đến 0,624. Các tương quan giữa các biến độc lập dao động từ 0,395 đến 0,468, cho thấy không có vấn đề đa cộng tuyến nghiêm trọng vì tất cả các giá trị đều dưới 0,7.

4.5. Kết quả phân tích hồi quy bội

Phân tích hồi quy bội được thực hiện để kiểm tra mối quan hệ giả thuyết giữa các biến độc lập và Thành tích Net Zero. Kết quả được trình bày trong Bảng 6.

Bảng 6: Kết quả phân tích hồi quy bội

Mẫu		Hệ số không được chuẩn hóa		Hệ số chuẩn hóa	Hệ số (t)	Hệ số (Sig.)	Thống kê đa cộng tuyến	
		Hệ số (B)	Độ lệch chuẩn	Hệ số beta			Sức chịu đựng	Hệ số phóng đại phương sai
1	(Không thay đổi)	0,425	0,149	-	-2845	0,005	-	-
	GTA	0,216	0,059	0,216	3.682	0,000	0,654	1.528
	REI	0,384	0,061	0,384	6.245	0,000	0,609	1.642
	WMP	0,185	0,057	0,185	3.248	0,001	0,678	1,475
	Tập	0,162	0,055	0,162	2.924	0,004	0,696	1.436
	CEP	0,245	0,059	0,245	4.156	0,000	0,661	1.512

Nguồn: Tác giả phân tích dữ liệu khảo sát

Lưu ý . $R^2 = 0,625$ R^2 điều chỉnh = 0,614 Giá trị F = 58,246 ($p < 0,001$)

Mô hình hồi quy giải thích được 61,4% phương sai trong Thành tựu Không phát thải ròng (R^2 điều chỉnh = 0,614). Thống kê F có ý nghĩa (F = 58,246, $p < 0,001$), cho thấy mô hình phù hợp tốt. Tất cả các giá trị VIF đều dưới 2, xác nhận không có đa cộng tuyến. Tất cả các biến độc lập đều cho thấy mối quan hệ tích cực đáng kể với Thành tựu Không phát thải ròng, trong đó Đầu tư năng lượng tái tạo ($\beta = 0,384$, $p < 0,001$) có tác động mạnh nhất, tiếp theo là Nguyên tắc kinh tế tuần hoàn ($\beta = 0,245$, $p < 0,001$) và Áp dụng công nghệ xanh ($\beta = 0,216$, $p < 0,001$).

4.6. Kiểm tra độ mạnh mẽ và độ lệch phương pháp chung

Để đảm bảo tính vững chắc của các phát hiện, các thử nghiệm bổ sung đã được tiến hành. Thử nghiệm một yếu tố của Harman đã xác nhận rằng phương sai phương pháp chung không phải là mối quan tâm lớn, với yếu tố lớn nhất chỉ giải thích được 28,5% tổng phương sai. Hơn nữa , 6 chẩn đoán đa cộng tuyến không cho thấy vấn đề nghiêm trọng nào (VIF < 3).

4.7. Tóm tắt các phát hiện chính và ý nghĩa lý thuyết

Kết quả xác nhận rằng đầu tư năng lượng tái tạo và các nguyên tắc kinh tế tuần hoàn có ảnh hưởng mạnh nhất đến Đạt được mục tiêu phát thải ròng bằng không, phù hợp với nghiên cứu về tính bền vững trước đây. Những phát hiện này góp phần vào lý thuyết chuyển đổi bền vững bằng cách chứng minh vai trò quan trọng của việc áp dụng công nghệ và các mô hình kinh tế tuần hoàn trong du lịch.

4.8. Ý nghĩa quản lý

Ưu tiên đầu tư: Các doanh nghiệp du lịch nên ưu tiên cơ sở hạ tầng năng lượng tái tạo và thực hành kinh tế tuần hoàn để đẩy nhanh tiến độ đạt mục tiêu phát thải ròng bằng 0.

Khuyến nghị chính sách: Chính phủ nên cung cấp các ưu đãi tài chính và khuôn khổ pháp lý rõ ràng để hỗ trợ các doanh nghiệp áp dụng công nghệ xanh.

Lập kế hoạch phát triển bền vững chiến lược: Các nhà quản lý nên tích hợp các sáng kiến giảm thiểu chất thải và du lịch sinh thái vào các chiến lược phát triển bền vững rộng hơn.

Bằng cách giải quyết những khoảng trống trong nghiên cứu thực nghiệm về mục tiêu phát thải ròng bằng 0 trong du lịch, nghiên cứu này cung cấp một khuôn khổ vững chắc cho chính sách và hành động kinh doanh tại Việt Nam và nhiều nơi khác.

4.9. Thảo luận về kết quả nghiên cứu

Dựa trên kết quả phân tích từ nghiên cứu, năm yếu tố chính ảnh hưởng đến việc đạt được các mục tiêu Phát thải ròng bằng 0 trong du lịch đã được xác định. Đầu tư năng lượng tái tạo (REI) nổi lên là yếu tố có ảnh hưởng nhất ($\beta = 0,384$, $p < 0,001$), phù hợp với nghiên cứu của Sun và Kim (2022), cho thấy các tổ chức du lịch đầu tư nhiều hơn vào cơ sở hạ tầng năng lượng tái tạo đang đạt được tiến triển tốt hơn hướng tới các mục tiêu Phát thải ròng bằng 0. Tiếp theo, việc áp dụng Nguyên tắc kinh tế tuần hoàn (CEP) là yếu tố mạnh thứ hai ($\beta = 0,245$, $p < 0,001$), xác nhận những phát hiện của Miller và Johnson (2023) về tầm quan trọng của các hoạt động kinh tế tuần hoàn trong du lịch bền vững. Việc áp dụng

công nghệ xanh (GTA) cũng cho thấy tác động tích cực đáng kể (β = 0,216, p < 0,001), hỗ trợ cho nghiên cứu của Zhang và Wall (2023) về vai trò của công nghệ xanh trong hiệu suất môi trường. Thực hành quản lý chất thải (WMP) thể hiện ảnh hưởng tích cực (β = 0,185, p < 0,001), hỗ trợ nghiên cứu của Thompson và cộng sự (2023) về tầm quan trọng của việc quản lý chất thải hiệu quả trong việc giảm phát thải carbon trong lĩnh vực du lịch. Mặc dù có hệ số thấp nhất trong năm yếu tố, nhưng Tham gia du lịch sinh thái (EP) vẫn duy trì tác động tích cực đáng kể (β = 0,162, p < 0,004) đến Thành tựu phát thải ròng bằng 0, phù hợp với những phát hiện của Buckley (2023) về mối quan hệ giữa các hoạt động du lịch sinh thái và hiệu suất môi trường. Những phát hiện này làm nổi bật bản chất đa diện của việc đạt được các mục tiêu phát thải ròng bằng 0 trong lĩnh vực du lịch và cho thấy rằng một cách tiếp cận toàn diện kết hợp cả năm yếu tố, đặc biệt nhấn mạnh vào đầu tư năng lượng tái tạo và các nguyên tắc kinh tế tuần hoàn, sẽ hiệu quả nhất trong việc đạt được các mục tiêu phát thải ròng bằng 0. Sức mạnh giải thích mạnh mẽ của mô hình (R^2 điều chỉnh = 0,614) chỉ ra rằng năm yếu tố này cùng nhau chiếm một phần đáng kể trong sự thay đổi trong Thành tựu phát thải ròng bằng 0, cung cấp những hiểu biết có giá trị cho chính sách và thực tiễn trong phát triển du lịch bền vững.

5. KẾT LUẬN VÀ HÀM Ý CHÍNH SÁCH

5.1. Tóm tắt các phát hiện chính

Nghiên cứu này khám phá các yếu tố chính ảnh hưởng đến việc đạt được mục tiêu Net Zero trong ngành du lịch Việt Nam, giải quyết khoảng cách trong nghiên cứu thực nghiệm về quá trình chuyển đổi bền vững ở các thị trường đang phát triển. Nghiên cứu được hướng dẫn bởi câu hỏi trung tâm: Các yếu tố chính quyết định việc đạt được mục tiêu Net Zero trong du lịch là gì? Sử dụng phương pháp tiếp cận hỗn hợp, nghiên cứu đã tích hợp thông tin chi tiết từ 180 người tham gia ngành du lịch và 20 chuyên gia trong ngành, áp dụng các phân tích định lượng và định tính để đánh giá tác động của năm yếu tố quan trọng.

Các phát hiện khẳng định rằng đầu tư năng lượng tái tạo và các nguyên tắc kinh tế tuần hoàn có ảnh hưởng mạnh nhất đến việc đạt được mục tiêu phát thải ròng bằng 0, tiếp theo là việc áp dụng công nghệ xanh, các hoạt động quản lý chất thải và sự tham gia của du lịch sinh thái . Những kết quả này làm nổi bật bản chất đa chiều của quá trình chuyển đổi bền vững và củng cố nhu cầu về một cách tiếp cận tích hợp đối với hành động ứng phó với biến đổi khí hậu trong du lịch.

5.2. Hàm ý chính sách

5.2.1. Đầu tư vào cơ sở hạ tầng năng lượng tái tạo

Với việc đầu tư vào năng lượng tái tạo nổi lên như một yếu tố dự báo mạnh nhất về mục tiêu Net Zero (β = 0,384), các tổ chức du lịch nên ưu tiên đầu tư vào các giải pháp năng lượng tái tạo. Điều này bao gồm việc triển khai các tấm pin mặt trời, hệ thống năng lượng gió và các cơ sở lưu trữ năng lượng như một phần của kế hoạch chuyển đổi năng lượng toàn diện dài hạn. Các tổ chức được khuyến khích thiết lập quan hệ đối tác chiến lược với các nhà cung cấp năng lượng tái tạo và nhà cung cấp công nghệ, đồng thời khám phá các cơ chế tài chính sáng tạo như trái phiếu xanh hoặc các khoản vay liên kết với tính bền vững để hỗ trợ các khoản đầu tư này. Một cách tiếp cận tích hợp như vậy đối với việc áp dụng năng lượng tái tạo sẽ đóng góp đáng kể vào việc đạt được các mục tiêu Net Zero trong lĩnh vực du lịch.

5.2.2. Thực hiện các hoạt động kinh tế tuần hoàn

Là yếu tố có ảnh hưởng lớn thứ hai (β = 0,245), các nguyên tắc kinh tế tuần hoàn nên được nhúng sâu vào hoạt động du lịch. Các tổ chức nên tập trung vào việc phát triển các chương trình giảm thiểu chất thải toàn diện và thiết kế các dịch vụ theo hướng tuần hoàn. Điều này có thể đạt được thông qua việc thiết lập quan hệ đối tác với các nhà cung cấp có ý thức bảo vệ môi trường, cung cấp đào tạo chuyên sâu cho nhân viên về các hoạt động kinh tế tuần hoàn và triển khai các hệ thống giám sát mạnh mẽ để đo lường kết quả. Việc tích hợp các hoạt động này sẽ tạo ra một mô hình hoạt động bền vững hơn đồng thời hỗ trợ các mục tiêu Net Zero.

5.2.3. Tích hợp công nghệ xanh

Với tác động đáng kể đến mục tiêu đạt được Net Zero (β = 0,216), việc áp dụng công nghệ xanh là một lĩnh vực quan trọng để đầu tư. Các tổ chức du lịch nên tập trung vào việc triển khai các hệ thống quản lý tòa nhà thông minh và các công nghệ tiết kiệm năng lượng trong khi áp dụng các giải pháp giao thông thân thiện với môi trường. Đánh giá thường xuyên về hiệu quả công nghệ và các chương trình đào tạo toàn diện cho nhân viên là điều cần thiết để tối đa hóa lợi ích của các khoản đầu tư công nghệ này. Việc tích hợp các công nghệ xanh này nên được xem là một công cụ chiến lược để

đạt được các mục tiêu phát triển bền vững dài hạn.

5.2.4. Nâng cao hệ thống quản lý chất thải

Các hoạt động quản lý chất thải (β = 0,185) đóng vai trò quan trọng trong việc đạt được mục tiêu Net Zero. Các tổ chức nên triển khai các chương trình phân loại và tái chế chất thải toàn diện, được hỗ trợ bởi các khoản đầu tư vào công nghệ giảm thiểu chất thải. Thiết lập quan hệ đối tác với các công ty quản lý chất thải chuyên biệt và đặt ra các mục tiêu giảm thiểu rõ ràng là những bước quan trọng. Việc theo dõi và báo cáo thường xuyên các số liệu về chất thải sẽ giúp theo dõi tiến độ và xác định các lĩnh vực cần cải thiện trong chiến lược quản lý chất thải của tổ chức.

5.2.5. Thúc đẩy các sáng kiến du lịch sinh thái

Mặc dù có hệ số thấp nhất (β = 0,162), các sáng kiến du lịch sinh thái vẫn là một yếu tố đóng góp đáng kể vào mục tiêu Net Zero. Các tổ chức du lịch nên tập trung vào việc phát triển các sản phẩm và trải nghiệm du lịch bền vững giúp giảm thiểu tác động đến môi trường đồng thời tối đa hóa giá trị giáo dục. Điều này bao gồm hợp tác với cộng đồng địa phương, triển khai các chương trình giáo dục về môi trường và đạt được các chứng nhận sinh thái có liên quan. Việc giám sát thường xuyên và truyền đạt minh bạch về tác động đến môi trường sẽ giúp duy trì lòng tin của các bên liên quan và hỗ trợ cải tiến liên tục.

5.3. Đóng góp lý thuyết và thực tiễn

Nghiên cứu này thúc đẩy diễn ngôn học thuật về du lịch bền vững bằng cách tích hợp ba quan điểm lý thuyết chính: **Lý thuyết chuyển đổi bền vững, Lý thuyết áp dụng đổi mới và Lý thuyết thay đổi thể chế** . Bằng cách chứng minh cách các lý thuyết này giao thoa trong ngành du lịch, nghiên cứu cung cấp một khuôn khổ có cấu trúc để hiểu cách các doanh nghiệp có thể chuyển đổi sang mục tiêu phát thải ròng bằng 0.

Hơn nữa, nghiên cứu này giới thiệu một mô hình được xác thực theo kinh nghiệm, định lượng tác động tương đối của các động lực phát triển bền vững khác nhau trong du lịch. Việc đưa vào các hướng dẫn phát triển bền vững gần đây của UNWTO và các nghiên cứu điển hình càng củng cố thêm tính liên quan của nó đối với diễn ngôn toàn cầu đang phát triển về khả năng phục hồi khí hậu trong du lịch.

Từ góc độ quản lý, nghiên cứu cung cấp những hiểu biết rõ ràng và có thể thực hiện được cho các nhà hoạch định chính sách và lãnh đạo doanh nghiệp:

– Đầu tư chiến lược vào năng lượng tái tạo: Các doanh nghiệp du lịch nên ưu tiên cơ sở hạ tầng năng lượng tái tạo và tích hợp các giải pháp trung hòa carbon vào mô hình hoạt động của mình.

– Áp dụng các hoạt động kinh tế tuần hoàn: Các doanh nghiệp nên áp dụng các nguyên tắc kinh tế tuần hoàn bằng cách giảm thiểu chất thải, nâng cao hiệu quả sử dụng tài nguyên và thúc đẩy chuỗi cung ứng khép kín.

– Công nghệ và Đổi mới: Việc áp dụng công nghệ xanh cần được hỗ trợ thông qua các sáng kiến chia sẻ kiến thức trên toàn ngành và các ưu đãi tài chính cho các doanh nghiệp vừa và nhỏ.

– Hỗ trợ về chính sách và quy định: Chính phủ nên thực hiện các khoản trợ cấp có mục tiêu, ưu đãi thuế và cơ chế định giá carbon để tạo điều kiện chuyển đổi nhanh chóng sang mục tiêu phát thải ròng bằng 0.

5.4. Ý nghĩa đối với nghiên cứu trong tương lai

Trong khi nghiên cứu này cung cấp những hiểu biết quan trọng, nó cũng nêu bật các lĩnh vực cho nghiên cứu trong tương lai. Các nghiên cứu trong tương lai có thể:

– Mở rộng phân tích sang bối cảnh khu vực rộng hơn bằng cách so sánh các chiến lược Phát thải ròng bằng 0 ở các thị trường du lịch khác nhau.

– Nghiên cứu những tác động dài hạn của đầu tư bền vững đối với hiệu quả tài chính.

– Khám phá các yếu tố hành vi ảnh hưởng đến cam kết của doanh nghiệp du lịch đối với mục tiêu phát thải ròng bằng 0.

5.5. Đề xuất chính sách

Dựa trên những phát hiện nghiên cứu, các nhà hoạch định chính sách nên thiết lập một hệ thống hỗ trợ toàn diện để đạt được mục tiêu Phát thải ròng bằng 0 trong du lịch. Hệ thống này nên bao gồm bốn yếu tố chính: một khuôn khổ pháp

lý rõ ràng với các hướng dẫn thực hiện cụ thể và các mục tiêu giảm carbon; các cơ chế hỗ trợ tài chính mạnh mẽ bao gồm các ưu đãi thuế và các chương trình tài trợ xanh; các chương trình xây dựng năng lực toàn diện thông qua đào tạo ngành và các nền tảng chia sẻ kiến thức; và các hệ thống giám sát và báo cáo chuẩn hóa để theo dõi hiệu suất môi trường. Cần đặc biệt chú ý đến việc hỗ trợ các doanh nghiệp du lịch vừa và nhỏ thông qua các sáng kiến này. Việc thực hiện thành công các khuyến nghị này đòi hỏi những nỗ lực phối hợp giữa các cơ quan chính phủ, các cơ quan trong ngành và các tổ chức du lịch, được hỗ trợ bởi việc xem xét và cập nhật thường xuyên để đảm bảo hiệu quả liên tục của họ trong việc thúc đẩy ngành hướng tới các mục tiêu Phát thải ròng bằng 0.

Nghiên cứu này đóng góp vào cả lý thuyết và thực hành bằng cách xác định các yếu tố chính tạo nên Net Zero trong du lịch và đề xuất một phương pháp tiếp cận có cấu trúc cho các bên liên quan trong ngành. Bằng cách liên kết các câu hỏi nghiên cứu với các hiểu biết dựa trên dữ liệu và các khuôn khổ lý thuyết, nghiên cứu này nhấn mạnh tính cấp thiết của quá trình chuyển đổi bền vững trong du lịch và cung cấp nền tảng cho các chính sách và chiến lược kinh doanh trong tương lai.

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