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Exploring the Nexus between Digital Economy and Green Growth: Insights from Emerging Economies

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Abstract

The digital economy creates new development space, opening high-speed and sustainable growth opportunities for Vietnam to become a leading country in the region in digital economic development and green growth. Thus, the article's objectives are to explore the key factors affecting the digital economy and their impacts on green growth. Based on the above goal, the authors used qualitative and quantitative methodologies to analyze the data, and the study used descriptive statistical methods, including assessing the mean value and standard deviation and utilizing a structural equation model using SPSS 20.0 and Amos from surveying a sample size of 250 persons related to management, economics, banks, research institutes, and universities in 10 provinces in Vietnam. The article's findings have five determinants influencing the digital economy and impacting the digital economy on green growth. Finally, the study's novelty helps policymakers and provincial managers apply research results to develop the digital economy and green growth. Mainly, many proposed solutions exist to realize the parallelism of the digital economy and the green economy; these policy recommendations pay more attention to investment in human resource quality, technological innovation, perfect digital policies, investment in digital infrastructure, and promote propaganda work to raise awareness of the entire society about the digital economy.

Keywords:
Digital;
Economy;
Development;
Green;
Growth;
Policy.

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1- Introduction

The Fourth Industrial Revolution has profoundly impacted all areas of socio-economic life through the interconnected development of digital technologies and data. More and more diverse new business forms are appearing, creating massive, rapid, and significant changes in every facet of social existence. Besides, the global digital economic wave is A novel overarching tendency is emerging, serving as a pivotal catalyst for the reorganization of growth resources, the reshaping of the economic structure, and the transformation of the global competitiveness paradigm [1, 2]. The driving role and impact of the digital economy in forming a new growth method (digital growth) is reflected in the emergence of many new industries and the blurring of geographical borders between countries. New business models with the core organization and operating methods based on digital technology applications. Developing digital technology promotes productivity and efficiency growth, making the digital economy increasingly crucial to countries' gross domestic product [3, 4]. As the Fourth Industrial Revolution is developing strongly and the post-Covid-19 recovery context is taking place globally, whichever country successfully takes advantage of opportunities to build the digital economy will create the competitive edge to break through and rise strongly.

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In addition, the digital economy has many remarkable developments, especially in developing countries. Digital technology has supported the lives of people and consumers, helped improve the productivity of workers and businesses, and helped people quickly access services from the government [5, 6]. Around the world, there are many different definitions of the digital economy. The digitalization of economic activity integrates data and the Internet into product production processes and new household and government consumption forms, and the digital economy merges several standard technologies and socio-economic activities through the Internet and related technologies, including infrastructure such as bandwidth lines, broadband, routers, computers, smartphones, applications by Google, Salesforce, and functions such as the Internet of Things, data analytics, and cloud computing [7, 8]. The digital economy encompasses the economic output generated by digital technology, wherein business models are centered around the provision of digital goods or services [9, 10]. This includes the digital sector as well as the rising digital and platform services. The scholarly investigation of the digital economy has brought up many conceptual frameworks that exhibit numerous commonalities, however, provide distinct viewpoints. The task of standardizing the measurement of digital economic activity is a significant problem.

The promotion of national digital transformation in Vietnam encompasses a national digital transformation program spanning from 2025 to 2030, effectively demonstrating the perspective of fostering the advancement of many foundations, such as the digital economy. The year 2020 witnessed the implementation of several national digital transformation policy plans, signifying a significant milestone in the promotion and dissemination of awareness regarding the concept of digital transformation. The year 2021 in Vietnam marks the commencement of digital transformation initiatives, as well as the practical application thereof, under the backdrop of the ongoing pandemic. Vietnam exhibited an expedited pace in its endeavors towards national digital transformation in the year 2022. This was seen by the approval of the National Strategy for Developing the Digital Economy and Society, which is set to be implemented until 2025, with a forward-looking vision extending until 2030.

The digital economy incorporates several components, including information technology (IT), the IT industry, and telecommunications services. Additionally, it includes the platform digital economy, which involves digital platforms, online systems that connect supply and demand, and online services. Furthermore, the digital economy industry is an integral part of this strategy [11, 12]. However, Vietnam's digital economy is in a new stage of development, while institutional conditions, policies, infrastructure, resources, etc., are not synchronous and complete. Besides the initial positive results, the country's digital economy's development also reveals many limitations. In the coming time, promoting achievements, gradually overcoming difficulties and constraints, and promoting digital economic development based on science, technology, and innovation are identified as crucial and urgent tasks. Especially in Vietnam, there is no official quantitative research on critical factors affecting the digital economy and green growth. This is also a gap in research and serves as a scientific basis for the authors to participate in this research. Therefore, there is a need for policy recommendations to promote digital economic development and green growth in Vietnam both in the short term and in the long term. Based on the things mentioned above, the authors presented the structure of the article, including: (1) introduction; (2) literature review and hypothesis development; (3) Methods of research; (4) Results and discussion; and (5) Conclusions and policy recommendations.

2- Literature Review and Hypothesis Development

2-1- The Concept of Digital Economy (Y1)

The digital economy is a much-debated notion in recent times. As per the researchers, the digital economy refers to economic activities that rely on digital technology and digital data as the main input factor. It operates primarily in the digital environment and utilizes information technology and telecommunications to enhance labor productivity, develop new business models, and optimize the economic structure [13-15]. The digital economy is the Internet, new, or network economy. The study team posits that the digital economy may be defined as an economy that primarily relies on digital technology, particularly electronic transactions carried out over the Internet [16-18].

The digital economy encompasses several sectors and economies integrated digital technology into their operations and processes [19, 20]. The digital economy can help increase labor productivity, innovate business models, and optimize economic structure. It can also help create great economic values that promote green growth and sustainable development [21-23]. However, the digital economy also poses many challenges, such as information security, data management, and training of high-quality human resources, and requires clear support policies and legal regulations to ensure sustainable development.

Thus, conceptually, although there are many different approaches, most agree that the digital economy is a progressive economy in which relationships, economic and financial activities... The production, distribution, exchange, and consumption network of goods and services on the global market is implemented based on modern science and technology [24, 25]. Although there is no universal definition of the digital economy and many ways of measuring it, there is general agreement on the most basic principles that define the structure of the digital economy [26, 27].

The digital economy only includes the fields of information and communication technology, while in a broader sense, it contains industries and occupations with business models associated with digital technology and digital platforms such as online platforms, platform support services, such as sharing economy, and community finance. The broadest meaning of digital economy includes the entire network of economic and social activities based on digital platforms, economic sectors, digital government, and digital society [28–30].

2-2- The Concept of the Green Growth (Y2)

In order to combat climate change, end hunger, alleviate poverty, and use natural resources more efficiently, the idea of "Green growth" was proposed as a means to spur long-term economic expansion [31, 32]. In order to achieve sustainable economic growth, it is necessary to implement a number of changes, such as revising the growth model, reorganizing the economy to capitalize on comparative advantages, conducting research and applying advanced technology to make the economy more efficient and competitive, building modern infrastructure systems to make better use of natural resources, decreasing emissions of greenhouse gases, adapting to climate change, alleviating hunger and poverty, and so on [33–35]. In order to achieve this goal, we need to implement a circular economic model that makes efficient use of energy and natural resources while also reducing waste, utilizing digital technology, and undergoing digital transformation. By greening economic sectors, we can improve the quality of growth, gain a competitive advantage, and reduce our negative environmental impacts [15, 18].

Moreover, green growth focuses on responsible energy use, concern for global warming, resource use and reforestation, and pollution and environmental damage prevention. In this mode of growth, many necessary initial costs are often very high, especially those related to energy production. Green energy research and development is expensive and is still in its early stages, not yet considered ultimately economically viable by the public [36-38].

Green growth, also known as the development of a green economy, involves reorganizing economic activities and infrastructure to achieve more favorable outcomes from investments in resources, human capital, and finance. Simultaneously, it aims to decrease greenhouse gas emissions, decrease reliance on and consumption of natural resources, decrease waste generation, and mitigate social inequality [20, 23]. Green growth fosters economic expansion and advancement while guaranteeing the preservation of natural resources and their vital environmental functions for human well-being. In order to achieve this, it is crucial for green growth to act as a catalyst for investment and innovation, serving as a foundation for economic growth and facilitating the emergence of new economic possibilities [30, 35, 39].

Thus, green growth concepts are increasingly gaining attention on international agendas in the context of the COVID-19 pandemic and the current risk of economic recession. To cope with the negative impacts of economic growth on the environment, the international community is trying to find solutions to maintain a sustainable socio-economic system. Green growth aims to aim at human welfare and reduce environmental risks in the long term, with some fundamental factors determining the core inputs of investing in natural capital, reducing carbon emissions in the economy, and creating green jobs [38, 39].

In contrast to economies that operate on non-renewable resources and inefficient methods, green growth is based on business activities and other economic transactions that do not depend on or cause harmful damage to the environment. Green growth is essential to sustainable development and is an integrated approach that combines socio-economic growth and environmental conservation in a close, rational, and harmonious manner, meeting the current generation's needs but not affecting future generations [40, 41].

2-3- The Concept of Quality of Digital Human Resources (X1)

The quality of digital human resources (X1): The function of human resources, particularly those of high quality, is of utmost importance in the socio-economic advancement of any nation, encompassing the development of human resources for the digital economy. Within the framework of the Fourth Industrial Revolution, emerging nations place significant emphasis on the establishment and cultivation of proficient human capital to effectively address the demands associated with advancing industrialization, national modernization, and ongoing global integration [1, 42, 43].

Additionally, the government actively promotes the cultivation and advancement of high-caliber human capital. The establishment of national innovation centers with a primary focus on core technologies, particularly digital technology, is being pursued with a strong emphasis on business-oriented objectives [5, 16]. These centers aim to collaborate with universities and research institutions, utilizing their expertise as topics of study and technology implementation. The implementation of a comprehensive reorganization of the system of public scientific and technical research institutes. Enhance state funding allocation and optimize the efficacy of scientific and technical research through the implementation of a novel management framework [3, 44, 45]. Propose novel systems and regulations to effectively manage science and technology while actively promoting and mobilizing substantial investment resources towards the study, development, and implementation of scientific and technological advancements.

In contemporary society, as we see a gradual transition towards a knowledge-based economy and the ongoing process of globalization and international economic integration, the significance of human resources, particularly those of high caliber, is progressively emerging and assuming a pivotal role [26, 34]. Contemporary growth theories claim that in order for an economy to achieve sustained and substantial growth, it must depend on a minimum of three foundational pillars: the adoption and implementation of novel technological advancements, the establishment and enhancement of contemporary infrastructure, and the augmentation of human capital.

The primary catalyst for achieving sustainable economic growth is in individuals, particularly those with high-quality human resources [16, 46, 47]. These individuals are characterized by their commitment to progress, possessing skills, knowledge, expertise, experience, and creative abilities that enable them to serve as a valuable kind of capital, sometimes referred to as human capital. Thus, the authors showed that the quality of digital human resources affects the digital economy with hypothesis H1 is:

H1: *Quality of digital human resources positively affecting the digital economy*.

2-4- The Concept of Perfecting Digital Policies (X2)

Perfect digital policies (X2): Research findings indicate that the government has implemented supplementary measures, made amendments, and enhanced existing institutions while concurrently establishing a legislative framework to facilitate the process of digital transformation. Additionally, institutional solutions, technology policies, ministries, branches, and localities need to improve the framework of mechanisms, policies, and laws towards inter-regional, inter-sectoral coordination and integration of growth goals and solutions. green to promote economic restructuring associated with innovating growth models and optimizing resources, especially in building multi-purpose technology infrastructure [31, 34, 47].

State management authorities are required to consistently revise, finalize, modify, and enhance rules and legal documents pertaining to digital science and technology. Simultaneously, it is imperative to establish regulations that facilitate the promotion of business models and foster the advancement of inventive and new services, product lines, and digital technologies [48, 49]. From a business perspective, it is imperative to prioritize the construction of persuasive business plans and strategies that align with the attributes of digital technology. This facilitated the advancement of innovative goods and service offerings.

Furthermore, various studies have demonstrated that enhancing the institutional framework that aligns with the digital business environment fosters conducive circumstances for innovation, thereby enabling the digital economy to expand its scope and augment its contribution to overall growth [49]. To facilitate this, it is imperative to establish a comprehensive research framework that incorporates references and connections in order to disseminate green norms, standards, and technical guidelines. Additionally, it is crucial to promptly develop and release a comprehensive set of indicators that can effectively measure green growth at the national level [50, 51].

The inclusion of several green growth aims within the framework of overall socio-economic development targets and digital economic and social development goals is imperative. It is crucial to promptly finalize and implement the comprehensive set of green growth targets. Thus, the authors showed that the proposed research hypothesis is:

H2: *Perfect digital policies positively affecting digital economy.*

2-5- The Concept of Investment in Digital Infrastructure (X3)

Investment in digital infrastructure (X3): Studies also show that developing and perfecting digital infrastructure. Promote upgrading technical infrastructure to strictly manage and control online payments, especially cross-border transactions. Proactively improve the digital payment infrastructure system in parallel with unifying and synchronizing non-cash payment methods for transactions nationwide [21, 37]. Focus on converting internet protocols to new generations, expanding internet connections regionally and worldwide, upgrading 4G networks, and accelerating 5G network development. Besides, it promotes the disbursement of investment projects to develop digital infrastructure towards synchronous infrastructure development, ensuring information connection, data storage and processing, and information safety and security in the environment number field [23, 28]. Promote infrastructure development for e-commerce activities, especially electronic payment systems. Additional research findings also highlight the importance of integrating the simultaneous enhancement of critical and widely used digital infrastructure and services with the establishment of national budget allocation and management strategies in order to effectively implement the green growth strategy. Furthermore, it is imperative to establish comprehensive financial policies that are rational and coherent to facilitate the advancement of digital transformation and promote sustainable environmental practices [30, 31, 35]. These policies should encompass a range of measures such as taxation, fees, subsidies, support funds, punishments, and the implementation of green and digital standards. Thus, the authors proposed research hypothesis H3 is:

H3: *Investment in digital infrastructure positively affecting digital economy.*

2-6- The Concept of Raising Awareness of the Entire Society about Digital Transformation (X4)

Raise awareness of the entire society about digital transformation (X4): Studies show that promoting propaganda raises awareness about digital transformation and the development of the digital economy. Governments at all levels need to pay deep attention to increasing society's understanding of digital transformation. Strengthen and innovate propaganda methods through mass media and social media. Develop specific, large-scale plans to popularize knowledge about digital transformation for all people [33, 39].

Raising awareness and understanding both digital economic development's benefits and environmental challenges properly and comprehensively are prerequisites for sustainable development. There is the best preparation for integrating these development trends for leaders at all levels in state management agencies, industries, localities, and the business sector, mainly medium and large enterprises, small and super small. Different parts of the digital economy will have environmental impacts at different levels, so key digital enterprises play a leading role in developing some telecommunications and information technology enterprises [34, 39, 42].

Leading digital technology infrastructure as the foundation for the digital economy and digital society needs to be associated with ensuring environmental requirements. Thus, the authors showed that raising awareness of the entire community about digital transformation affects the digital economy, and the proposed research hypothesis is:

H4: *Raise awareness of the entire society about digital transformation positively affecting the digital economy.*

2-7- The Concept of Technological Innovation (X5)

Technological innovation (X5): Research indicates that forward-thinking enterprises engage in digital transformation to actively capitalize on opportunities, enhance business models, integrate digital technologies, and foster the advancement of product solutions production and trade through digitalization. By doing so, these businesses can participate more effectively in the global supply chain, enhance their management capabilities in line with emerging production, business, and collaboration models [18, 44].

Simultaneously, it is imperative to bolster the capacity of enterprises to engage in green innovation by enhancing the efficacy of associated systems and mechanisms. This can be achieved through the implementation of measures such as green procurement. At the same time, it promotes applying green economic tools for production and consumption activities, a system of standards, and national green classification criteria, ensuring consistency, transparency, and regular updates for programs, projects, products, services, technologies, and industries, and the integration of innovation accomplishments into green technology. The overarching objective is to augment the rate of return on green technology innovation and invigorate the enterprise's propensity for green technology innovation [23, 46].

In order to facilitate the digital transformation and green innovation, it is imperative to capitalize on opportunities for cost reduction both internally and externally, foster specialized roles within enterprises, and establish a strong correlation between digital transformation and green innovation within business strategies [35, 49, 50]. This enhanced corporate social responsibility and contribute to the widespread influence of digital transformation and green technology innovation. Thus, the authors showed that technological innovation affects the digital economy, and the proposed research hypothesis is:

H5: *Technological innovation positively affecting the digital economy.*

2-8- The Digital Economy affecting Green Growth

The digital economy and green growth have emerged as the prevailing approaches for development in the contemporary era, effectively facilitating the pursuit of swift and sustainable progress throughout the initial decades of the 21st century. For achieving rapid yet sustainable expansion, the optimal approach within the framework of the Fourth Industrial Revolution is embracing green development and digital growth. This is mostly due to the swift pace at which digital growth is occurring, along with its little resource use. Thus, the digital economy is a focal point in the linkages with other sectors, playing an essential role in making environmental impacts visible and creating opportunities to reduce them [21, 48, 51].

Policymakers have recognized the need to introduce policies that prioritize digital economic development to achieve green growth goals, unifying a global action perspective to solve the problems of climate change having a significant impact on economic growth plans, extending beyond regional or local considerations to encompass sectors such as the digital economy. In addition, the digital economy and green growth hold significant prominence within the realm of environmental policy and sustainable development.

Digital economics must be associated with a green economy, circular economy, knowledge economy, and sharing economy, contributing to building an independent and self-reliant economy related to deep, substantive, and practical international integration. Besides, it presents novel frameworks and generates prospects for sustainable development and

economic recuperation amidst the financial crisis triggered by the effect of the pandemic [25, 42, 52]. Therefore, the authors showed that the digital economy affects green growth, and the proposed research hypothesis is:

H6: *Digital economy positively affecting green growth.*

Based on the theoretical approach from the above research works and develop the digital economy comprehensively and comprehensively, prioritizing quality over quantity; Combine synchronously and effectively develop digital infrastructure, digital services, digital data, digital skills, digital institutions, and ensure network security and information safety. Thus, the authors offered research orientation on critical factors affecting the digital economy with the proposed research model in following Figure 1.

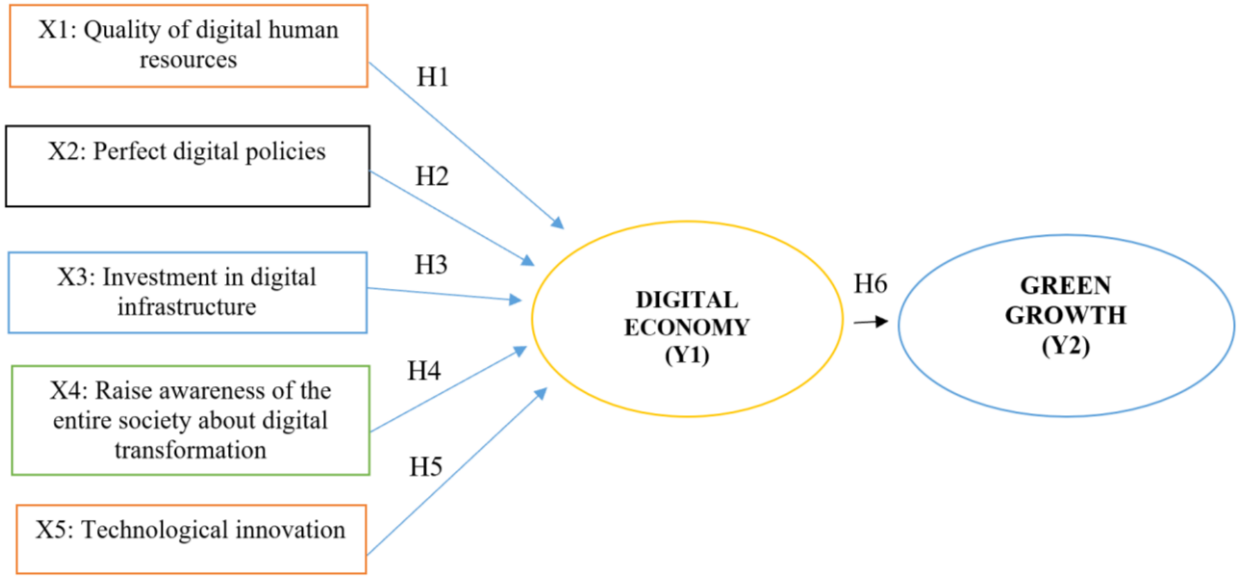

Figure 1. Five factors affecting digital economy and green growth

3- Methods of Research

This study primarily utilized two primary research methods: qualitative research and quantitative analysis. The researchers conducted the study in two distinct periods (Figure 2):

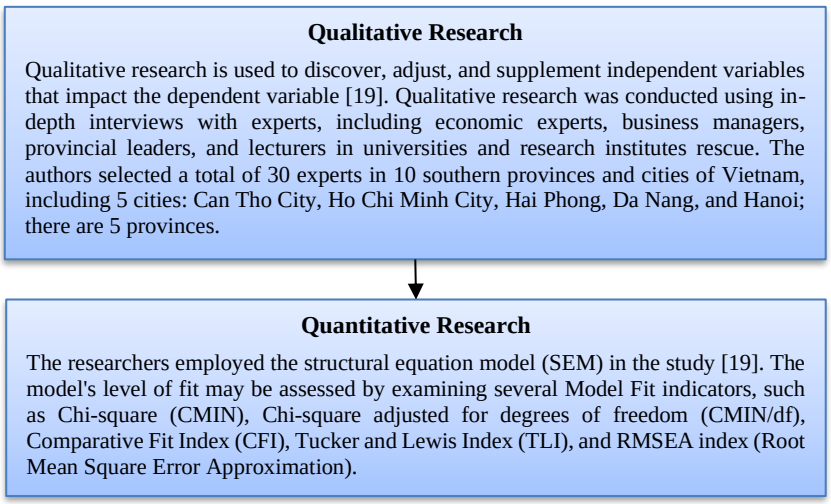

Figure 2. Factors affecting digital economy and green growth

To achieve the research goal, the study uses two research methods: (1) qualitative research and (2) quantitative research.

Qualitative research is used to discover, adjust, and supplement independent variables that impact the dependent variable. Qualitative research was conducted using in-depth interviews with experts, including economic experts, business managers, provincial leaders, and lecturers in universities and research institutes rescue [53]. The authors selected a total of 30 experts in 10 southern provinces and cities of Vietnam, including 5 cities: Can Tho City, Ho Chi

Minh City, Hai Phong, Da Nang, and Hanoi; there are 5 provinces: Dong Nai, Binh Duong, Ba Ria - Vung Tau, Long An and Binh Thuan. This study was conducted from February to April 2023 [53]. In addition, quantitative research was conducted in 2 phases. Phase 1 is preliminary research and investigation in a narrow scope, mainly in Ho Chi Minh City, and phase 2 is a large-scale official study. Phase 2 is carried out from May to July 2023, and this phase is carried out with a sample size of 250 people with experience and knowledge of the digital economy and green growth in the 10 provinces and cities mentioned above [53].

The research process entails several sequential steps: constructing a theoretical model, conducting model testing and validation, gathering initial data to assess the scale's reliability, collecting official data, performing scale factor analysis, assessing the scale's reliability, and finally, testing the research hypotheses and model. The study gathered data from a diverse range of information sources. The data included in the analysis is sourced from the following references.

Secondary information sources: Theoretical issues summarized in books and specialized domestic and international textbooks; Published statistical data and comprehensive reports of organizations and management agencies related to the digital economy and green growth. Results of previous research published in domestic and international scientific journals related to digital economy and green growth. The authors collected, analyzed, compared, and evaluated research on the digital economy and green growth to build an initial research model and concepts used in the article [53].

The primary sources of information are the original and uninterpreted sources that provide firsthand accounts or direct evidence of a certain topic or event. These sources are typically created by individuals who have direct knowledge or involvement in the subject. The first data collection is conducted through in-depth interviews. The official study model was constructed by utilizing the findings obtained from comprehensive interviews. Subsequently, the survey is responsible for the management of primary data. The authors employed questionnaires as a research tool to examine the many elements that influence the digital economy and green growth, as well as the distinctive qualities of these components and their impact. After being designed, the questionnaire and interview outline sought the opinions of scientists and experts to complete. The questionnaire was tested and finalized by interviews before deploying a large-scale survey from 250 relevant people in 10 provinces and cities of Vietnam.

Research plan: The research plan of the study is carried out through the following stages:

Stage 1: Document analysis; Work: In this step, the authors analyze and synthesize reference documents and research works of domestic and foreign researchers on microinsurance. Implementation time: from January to February 2023. Location: Desk study. The concepts in the research model are evaluated and tested based on survey data with a sample size of 250. Two main contents are carried out in this official research step: (i) statistical analysis of the model description, and (ii) the research model is tested by structural equation modeling, which tests the model and research hypotheses.

Stage 2: Having a sample size of 250 respondents for the model has 5 independent variables and 2 dependent variables; the minimum sample size for the study must be 90 persons [53]. However, the larger the sample size than the required minimum, the higher the reliability of the study, which reduces sampling biases. 250 survey questionnaires were issued, 219 valid questionnaires were collected, and the rate reached 87.60%. The process of implementing research may encounter problems such as sampling that does not achieve ideal goals and questions that are not reasonable. Therefore, the authors prepared a research plan to minimize these problems to ensure the reliability and representativeness of the sample and complete the measurement scale for the 219 questionnaires processed by SPSS 20.0 software and Amos.

The independent variables include X1: The quality of digital human resources; X2: Perfect digital policies; X3: Investment in digital infrastructure; X4: Raise awareness of the entire society about digital transformation; X5: Technological innovation. The dependent variables: Y1: The digital economy; Y2: Green growth.

Stage 3: The researchers employed the structural equation model (SEM) in their study. The model's level of fit may be assessed by examining several Model Fit indicators, such as Chi-square (CMIN), Chi-square adjusted for degrees of freedom (CMIN/df), Comparative Fit Index (CFI), Tucker and Lewis Index (TLI), and RMSEA index (Root Mean Square Error Approximation). The appropriateness of the model is determined by evaluating the goodness-of-fit indices, including the GFI, TLI, and CFI values, which should all be equal to or greater than 0.9 [53].

Additionally, the CMIN/df ratio should be less than or equal to 3, and the RMSEA should be less than or equal to 0.08 [53]. If the model satisfies the criteria of having TLI and CFI values more than or equal to 0.9, a CMIN/df value less than or equal to 3, and an RMSEA value less than or equal to 0.08, it can be deemed appropriate for the given data.

4- Results and Discussion

4-1- The Results of the Process of Digital Economic Development in Vietnam

Between 2020 and 2022, more than 50% of the ministries, branches, and municipalities within the country successfully formulated and executed initiatives, projects, and strategies aimed at digital transformation. Several technological businesses in Vietnam acquired expertise in core technologies, leading to the development of around 40

platforms under the 'Make in Vietnam' initiative. The implementation of communication and trade promotion plans, along with the adoption of digital strategies, has facilitated the consumption of agricultural products by individuals, communities, and enterprises. It has also attracted significant participation from foreign-invested enterprises, enhancing market engagement. Furthermore, these efforts have fostered collaborative partnerships with global counterparts, resulting in reduced trade promotion expenses. In 2022, the Ministry of Industry and Trade, in collaboration with other governmental bodies, facilitated more than 500 multinational international trade promotion conferences and over 1 million trading sessions with foreign partners.

The integration of contemporary scientific advancements and technological innovations has significantly contributed to the transformative developments observed in the domain of e-commerce. In the year 2021, Vietnam had a significant increase in the number of individuals engaging in digital platforms, with over 8 million new customers joining these platforms. A significant number of individuals and organizations utilize Internet services and technology for the purpose of engaging in commercial transactions involving the purchase and sale of various products and services. It has been observed that a substantial majority, namely over 95%, of digital enterprises have adopted the practice of accepting online payments. Additionally, a significant proportion, around 79%, of these entities make use of digital money transfers, while approximately 67% avail themselves of online lending services. On average, every organization utilized two platform numbers in order to cater to the demands of its customers.

Furthermore, within the realm of medicine, the implementation of an online network for medical examination and treatment has facilitated the connection of an additional 1,000 medical facilities, enabling remote examination and treatment in reducing the disparities in healthcare access across different areas, as well as between central and local levels. As a result, the referral rate experienced a fall to below 10%, leading to substantial cost savings amounting to billions of Vietnamese Dong and alleviating the burden on the healthcare system.

The integration of science and technology into the field of education and learning management has yielded positive outcomes, leading to advancements in both education and training. This integration has played a crucial role in enhancing the quality of training, particularly due to the expansion of educational opportunities to previously underserved populations residing in geographically challenging and isolated regions. One noteworthy achievement worth documenting is the significant number of high school students engaged in online learning, which stands at 79.7%. This figure surpasses the average of member nations within the Organization for Economic Cooperation and Development (OECD) by a substantial margin of 67.5%.

The utilization of online platforms for teaching and knowledge exchange has significantly improved the level of contact between educators and students. This practice has become indispensable, offering several advantages, including the reduction of commuting time, easy access to reference materials, and the promotion of self-directed learning and independent reading. Furthermore, the integration of digital technology in educational settings enhances the utilization of information technology by both educators and students. This positive development ensures the availability and accessibility of valuable resources. The next human resources will acquire proficiency in contemporary technology, therefore facilitating the accelerated development and seamless integration of the national digital economy with the global landscape.

In 2022, there was substantial development toward mastering technology, products, and services, promoting the introduction of Make in Viet Nam technology into economic and social activities. Therefore, the ratio of Vietnamese value to total revenue of the ICT sector in 2022 will reach 27% compared to 17.5% in 2020 and increase to 27% in 2022. The ratio of Vietnamese value in FDI enterprises accounts for 31.9%. Furthermore, the number of businesses and workers in the industry also tends to increase. One of the critical criteria for evaluating digital economic activities is e-commerce activities. In 2020–2022, the epidemic is complicated; e-commerce is a channel connecting the supply and demand of goods and services in the economy, promoting the recovery process of Vietnam's economy.

In 2020, the growth rate of e-commerce reached 15%; in 2021, this number will be 20%, with a scale of 16 billion USD (E-commerce Association, 2022). Vietnam has an average e-commerce growth rate of 20%/year and has been ranked among the top 5 countries with the world's leading e-commerce growth rate.

Difficulties and challenges in the process of deployment and implementation are the following:

The level of understanding among individuals and government officials on the advantages, prospects, and obstacles associated with the digital economy for socio-economic progress remains disparate across all sectors. Hence, the integration of digital economy datasets remains fragmented and dispersed, lacking interconnectivity across various governmental departments, sectors, and geographical regions. Moreover, it is worth noting that the legislative framework and institutional infrastructure pertaining to the advancement of the digital economy exhibit deficiencies and lack synchronization. Consequently, the complete potential for digital economic growth remains untapped. Despite the rapid advancements in science and technology, the emergence of the Covid-19 pandemic has introduced certain complexities for governmental bodies in terms of managing and levying taxes on online commercial activities, as well as safeguarding the rights of workers and consumers in the realm to effectively manage and find resolutions for disputes and conflicts

that arise within the digital environment, specifically pertaining to the actions and interests of organizations engaged in business, commercial, and civil movements.

Secondly, the formidable rivalry posed by international digital technology enterprises, characterized by their substantial growth prospects, inventive product offerings, and advanced technological content, is a significant obstacle for local firms. The inadequate competitiveness of several domestic firms in Vietnam can be attributed to the prevalence of small and medium-sized enterprises (SMEs) with constrained financial resources and low levels of technological advancement. In addition, the conventional buying behaviors, psychological factors, and cash expenditure preferences exhibited by most customers exert a substantial influence on the process of digital economy within firms. There exists a notable disparity in business conduct and consumption patterns between urban dwellers and people of rural, hilly, remote, and ethnic minority regions. This discrepancy poses distinct challenges for firms aiming to undertake a comprehensive digital transformation in these locations. The simultaneous development of the digital payment infrastructure system with the consolidation and harmonization of non-cash payment methods for transactions on a national scale.

Thirdly, although digital infrastructure has developed, it is still at a low level and cannot meet the needs of digital economic development. Having the speed of fixed and mobile broadband networks in Vietnam is quite average. Connecting and sharing two-way data from the information systems of ministries, branches, and localities with national data is not complete and ready. The reason is that the information system is not synchronized, so data sharing is impractical. At the same time, the rate of providing open data by state agencies is still low, only reaching 9%. The issue of information security still has many challenges.

Fourthly, institutions and policies are still not consistent and strict, such as regulations related to the management of e-commerce activities, digital finance, and digital banking, and regulations to ensure benefits for businesses and consumers in the digital environment, etc. A set of indicators and tools for measuring the digital economy has been issued but is incomplete because there is no unified measurement method in the world and Vietnam. Besides, human resources for digital transformation and economic development still lack skills and knowledge.

In the 2022 human resources recruitment trend report, in 2021, 43% of businesses lack personnel, of which information technology/software businesses have the highest shortage rate. In 2022, about 65% of companies plan to increase recruitment needs in the Information Technology industry. Human resources specialized in information security are also lacking. Human resources have not been professionally trained nor have practical experience in reviewing, evaluating, and handling information security incidents.

Finally, the availability and proficiency of human resources, particularly those specializing in information technology, are insufficient and subpar. Vietnam is presently facing a dearth of proficient technology engineers and managerial competencies that can effectively cater to the evolving demands of technology enterprises in the present and future. According to VietnamWorks online employment service company, it is estimated that every year, Vietnam lacks about 78,000 information technology workers, and by 2021, there is a shortage of about 500,000 information technology workers, meaning it can only meet 22% of the market demand. Network security, confidentiality, and information security are increasingly demanding.

The digital economy based on information technology and the Internet carries excellent risks regarding digital economy subjects' safety, information security, finance, and data privacy. In 2021, the Department of Information Security, Ministry of Information and Communications recorded 1,271 cyber-attacks causing problems in information systems, including 623 malware attacks, distributing malware programs, malicious programs or code capable of hindering the regular operation of the system, 449 phishing attacks impersonating reputable organizations such as banks, online transaction sites, or credit card companies, and 199 deface attacks such as cracking the system and accessing the web server to change the web interface and content.

4-2-Analysis of Descriptive Statistical Results for the Digital Economy and Green Growth

The digital economy has emerged as a significant driver of gross domestic product, particularly in the post-Covid-19 recovery phase. The assessment of the environmental implications of the digital economy has significant importance as it serves as a foundation for the identification and alignment of digital economic development policies with environmental concerns. This facilitates the establishment of a harmonious relationship between digital economic plans and strategies aimed at promoting sustainable and environmentally friendly growth. The contemporary discourse surrounding the potential of the digital economy and green economy as viable economic recovery strategies has garnered significant attention on both domestic and global scales. Too far, there has been a lack of strong integration between environmental regulations and socio-economic development policies, including those pertaining to the digital economy. However, there have been some recent endeavors that have sought to address this aspect. Sustainable development and environmental issues become more comprehensive. In addition, the quantitative research results collected questions with 219 valid votes from 250 votes, reaching a rate of 87.60%, and this is also the data included in the descriptive statistical analysis in Figure 3.

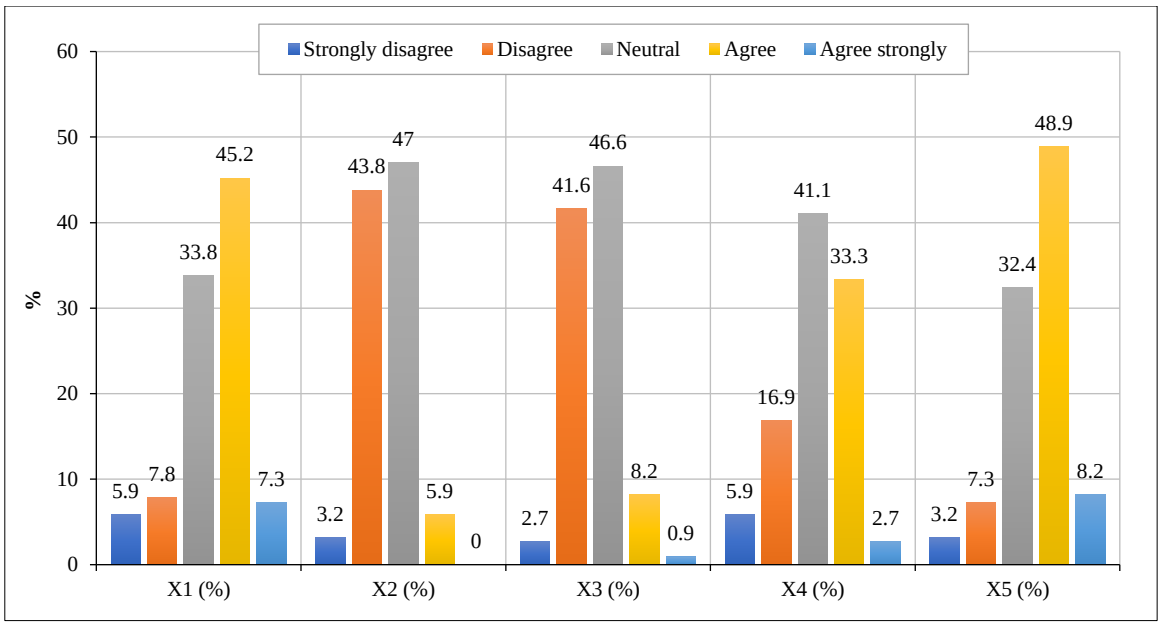

Figure 3. Five factors influencing digital economy and green growth

Figure 3 shows that research results had over 55 percent from level 3 to level 5. Besides, in 2020 and 2021, despite the Covid-19 epidemic, the digital economy of Vietnam had significant growth in the years 2020 and 2021, with a notable increase of around 25-30% in comparison to the preceding year, 2019. Digital economic growth has witnessed several accomplishments; however, Vietnam's achievements in this domain remain relatively limited when compared to other countries in the area and globally. In order to achieve the objective of attaining a digital economy accounting for 20% of the Gross Domestic Product (GDP) by the year 2025, Vietnam has several obstacles and problems during its transformation. There exists a lack of comprehensive understanding about the social community, as well as little knowledge pertaining to the digital economic growth, both in terms of state administration and company operations and among the general populace.

Besides, understanding of the digital economy, its potential for growth, and the associated possibilities and problems varies across authorities, firms, and individuals across different levels and sectors. Consequently, there is a lack of consistency in the awareness, strategies, and initiatives aimed at harnessing the benefits of the digital economy. The timeliness of digital economic developments is lacking. The phenomenon of digital transformation is observed to varying extents across different levels, such as restricted levels, sectors, locations, and enterprises. According to the Institute for Economic and Policy Research's (2020) annual Vietnam financial report, a significant proportion of Vietnamese industrial firms, namely 85%, remain excluded from the digital economy. Conversely, just a mere 13% of these enterprises have successfully transitioned to the digital economy. Recognition of the requirements of the digital economy and subsequent responses to digital economic developments in Vietnam remain sluggish, inconsistent, and lacking in comprehensive coordination. These constraints impede the progress of digitalization within the country's economy.

Furthermore, the legal and regulatory framework pertaining to the growth of the digital economy with incompleteness and inconsistent. The current state of institutions dedicated to digital economic growth is characterized by a lack of coherence, synchronicity, transparency, and constructive measures, resulting in several gaps. The exponential expansion of scientific and technological advancements, the global COVID-19 pandemic, and the advent of novel commercial strategies and innovative concepts have engendered complexities in the management of digital economic operations. The present study examines the management and tax collection challenges associated with online commercial activities, with a particular focus on businesses operating through social networks and engaging in cross-border service provision. Additionally, it explores the complexities surrounding the protection of workers' and consumers' rights within the online realm. Furthermore, it investigates the strategies employed for handling and resolving disputes and conflicts of interest among various stakeholders involved in digital business, commercial, and civil activities.

After analyzing the above situation, Vietnam needs to focus on the following five essential contents: (1) Increase awareness of the position, role, and importance of digital transformation to each citizen and business career and especially the leader; (2) Strengthen potential for digital transformation, considering this a critical task that requires priority in resource allocation; (3) Strengthen public-private cooperation, use public investment to lead private investment, and activate and mobilize all social resources. (4) Promote institutional improvement and create a legal corridor to promote national digital transformation and economic development. Promoting the development of digital infrastructure and platforms creates an essential premise for digital economic development. Promote innovation and start a business in digital transformation. (5) Promote the development of digital human resources and digital skills to meet socio-economic development requirements; promote cybersecurity and information security to protect the legitimate rights and interests of people and businesses; and protect national cyberspace sovereignty early and remotely.

Table 1 presents the mean values of all components, around 3.0. Moreover, the standard deviation has an approaching value of 1.0. The data presented demonstrates considerable potential for the advancement of Vietnam's digital economy and promotion of the information shown in Table 1. The advent of digital technology has facilitated the acquisition of data from many origins, encompassing personal smartphones as well as myriad sensor devices deployed in industrial and vehicular settings. The utilization of data streams and the analysis of such data offer significant value in both individual and community-based activities.

Table 1. Descriptive statistics for factors affecting digital economy and green growth

Content of the digital economy and green growth	N	Min	Max	Mean	Std. Deviation
X1: The quality of digital human resources	219	1.00	5.00	3.4018	0.94974
X2: Perfect digital policies	219	1.00	4.00	2.5571	0.65678
X3: Investment in digital infrastructure	219	1.00	5.00	2.6301	0.71370
X4: Raise awareness of the entire society about digital transformation	219	1.00	5.00	3.1005	0.91819
X5: Technological innovation	219	1.00	5.00	3.5160	0.86918
Y1: The digital economy	219	1.00	4.00	2.5251	0.60809
Y2: The green growth	219	1.00	4.00	2.5525	0.62862

Notes: Average values for determinants of the digital economy and green growth; n = 250 (219 samples and 219 values, 31 lack of information). The Std. Deviation is given in parentheses.

Furthermore, the emergence of the digital economy is attributed to the advancements in novel digital technology. The advent of digital platforms had a profound and transformative effect not just within the realm of information and communication technology but also across several other sectors like finance, transportation, manufacturing, communication, education, and healthcare, among others. Moreover, the digital economy facilitates increased engagement between producers and customers. Digital-based business models facilitate the interaction of sizable cohorts, resulting in beneficial outcomes for the whole network and enhanced efficiency through the mitigation of transaction expenses. E-commerce facilitates the process of purchasing products and services using internet platforms. The use of online advertising over the Internet has emerged as a mechanism to guarantee the precise dissemination of communications to distinct client segments. Furthermore, digital technology prioritizes customers and places them at the forefront. Consumers have a pivotal role in the operations of firms. The Internet enhances consumer empowerment by facilitating the unrestricted exchange and dissemination of thoughts and recommendations. The alteration of the customer's buying experience and its subsequent impact on the manufacturer's reputation are evident.

Table 2 shows testing results for five factors affecting the digital economy and green growth with sig. 0.01. Besides, the results of model testing show that the set of scales in the research model meets the level of fit with the data through the criteria of convergent validity, discriminant validity, composite reliability, and variance quote. The hypotheses in the SEM research model have no adjustment changes. The findings of this study indicate that the potential of the digital economy and green economy as viable strategies for economic recovery have garnered significant interest at both domestic and global levels. Thus far, there has been a lack of strong integration between environmental policies and strategies, and broader socio-economic development policies, particularly those pertaining to the digital economy. However, many recent efforts have addressed this perspective, making sustainable development and environmental issues more comprehensive.

Table 2. Testing coefficients for five factors affecting the digital economy and green growth

Variables	Unstandardized Estimate	Standardized Estimate	S.E.	C.R.	P	Results
Y1 ← X1	0.127	0.195	0.045	2.784	0.005	Accepted
Y1 ← X2	0.192	0.179	0.056	3.207	0.001	Accepted
Y1 ← X3	0.153	0.131	0.050	2.600	0.009	Accepted
Y1 ← X4	0.219	0.146	0.045	3.273	0.001	Accepted
Y1 ← X5	0.168	0.117	0.045	2.613	0.009	Accepted
Y2 ← Y1	0.901	0.924	0.031	29.384	*	Accepted

* 1%;

The digital economy is also a space for innovation because it opens new types of business and consumption. Digital transformation and digital economic development create three significant trends contributing to sustainable development: Disintermediation, decentralization, and dematerialization. Disintermediation is through platform economies, such as e-commerce platforms. Decentralization through the sharing economy, such as ride-hailing services. These three trends make the economy more efficient, competitive, and sustainable without causing environmental impact, making the economy grow greener.

Table 3 illustrates that Bootstrap is a resampling technique that involves replacement, whereby the original sample serves as the population, and N = 10000. The findings obtained using Bootstrap analysis with a sample size of 10,000 are aggregated and indicate that the estimations derived from the research model may be considered dependable. The phenomenon of digital economic development is currently emerging as a prominent trend and influential factor in advancing the global economy, while also making significant contributions towards the promotion of sustainable and environmentally friendly growth. Vietnam presently boasts a domestic market comprising approximately 100 million individuals, characterized by a significant proportion of young citizens, with 70% of the population actively utilizing the Internet. The nation exhibits a notable inclination towards innovation and a remarkable capacity to swiftly assimilate digital technology, positioning it among the global leaders in terms of the rapidity of its digital technology advancement. The prospective growth of Vietnam's digital economy holds significant potential for expansion and augmentation in the foreseeable future.

Table 3. Testing the research model estimates using Bootstrap (N = 10000 samples)

Variables	SE	SE-SE	Mean	Bias	SE-Bias	C.R	Results
Y1 ← X1	0.053	0.002	0.130	0.004	0.003	1.33	Accepted
Y1 ← X2	0.061	0.002	0.182	0.002	0.003	0.67	Accepted
Y1 ← X3	0.050	0.002	0.132	0.001	0.002	0.50	Accepted
Y1 ← X4	0.049	0.002	0.150	0.004	0.003	1.33	Accepted
Y1 ← X5	0.058	0.002	0.115	0.002	0.003	0.67	Accepted
Y2 ← Y1	0.028	0.001	0.924	0.001	0.002	0.50	Accepted

Figure 4 displays the testing outcomes for five key factors affecting the digital economy and green growth, with a statistically significant result at a significance level of 0.01. Five components need to be considered: X1: The quality of digital human resources; X2: Perfect digital policies; X3: Investment in digital infrastructure; X4: Raise awareness of the entire society about digital transformation; X5: Technological innovation. All standardized regression weights in the critical model reach the significance level of 0.01. The findings shown in Table 2 & 3 demonstrate the significance of five key elements in influencing the digital economy and promoting green growth. Notably, the digital economy has emerged as a crucial driver of gross domestic product, particularly in the post-Covid-19 recovery phase. The assessment of the environmental implications associated with the digital economy has significant importance as it serves as a foundation for the identification and alignment of digital economic development policies with environmental concerns. This process facilitates the establishment of a harmonious relationship between digital economic strategies and strategies aimed at promoting sustainable and environmentally friendly growth.

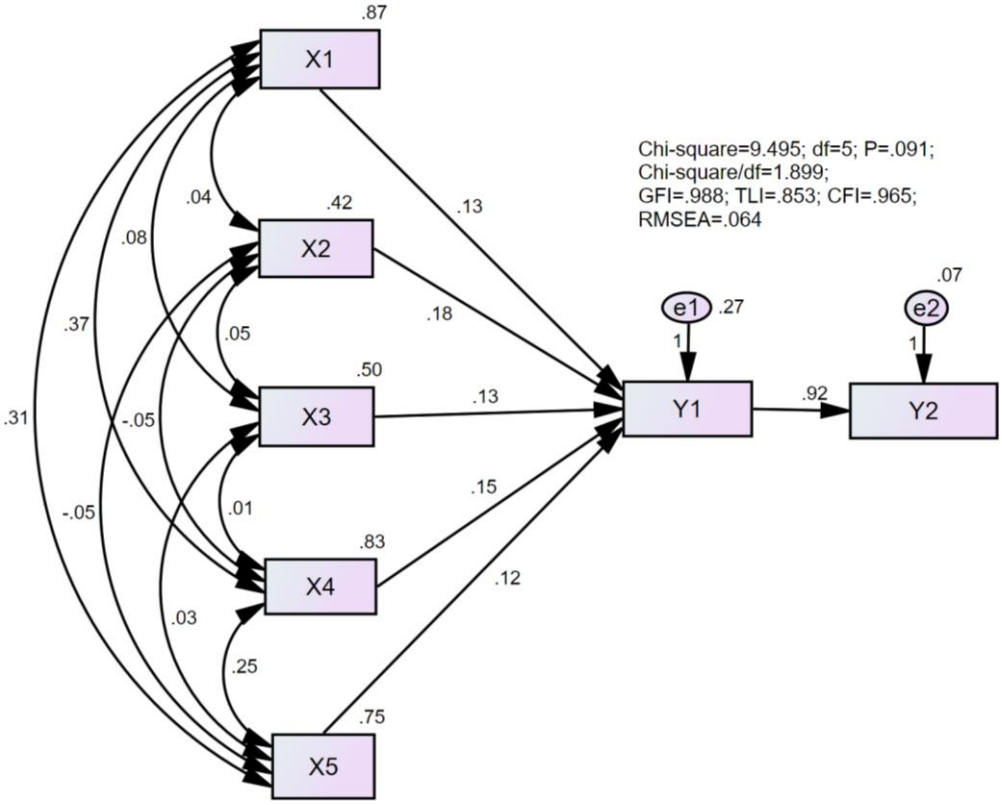

Figure 4. Testing results for factors affecting the digital economy and green growth

4-3- Discussions

Based on the testing, five key factors affect the digital economy and green growth, with a statistically significant result at a significance level of 0.01. Five components need to be considered: (1) The quality of digital human resources; (2) Perfect digital policies; (3) Investment in digital infrastructure; (4) Raise awareness of the entire society about digital transformation; (5) Technological innovation. Therefore, the digital economy is a topic of interest in promoting green growth. Vietnam's goal is for the contribution of the digital economy to GDP to reach 20% by 2025 and 30% by 2030. To achieve the goals as well as develop the digital economy in Vietnam, essential solutions are needed; policies, institutions, digital infrastructure, and human resources must be implemented synchronously, and the following contents need to be discussed:

(1) The impact of the quality of digital human resources on the digital economy is statistically significant, as shown in Table 2 with a significance level of 0.01, and the same results [1, 42, 43]. The digital economy poses many requirements, challenges, and difficulties that must be resolved with appropriate solutions and roadmaps in each stage, from building and perfecting mechanisms and policies to creating infrastructure. A synchronous and modern digital economic layer that controls risk and ensures safety in the digital environment. Digital human resources are human resources in the digital economy, the main force to deploy and realize the digital economy, determine the existence of the digital economy, and master devices of digital technology, operating it in production, business, and other activities of the economy. However, this human resource is lacking in quantity and quality to serve the development of the digital economy. Besides, the Industrial Revolution 4.0 is changing management operations as the development process of businesses. It can disrupt the labor market because, with automation, artificial intelligence (AI) gradually replaces humans, leaving millions of workers unemployed. That factor directly impacts the trend of developing digital human resources, especially in businesses. Meanwhile, the digital economy operates based on the application of digital technology, and human knowledge and creativity are the main driving forces. Therefore, digital human resources must have full intellectual, knowledge, and cultural capacity to organize, manage, and operate the economy. Developing digital human resources is a decisive factor in successfully building a digital economy in Vietnam.

(2) Perfect digital policies influencing the digital economy at a significance level of 0.01 in Table 2, and the same results [31, 34, 47]. The legal and institutional framework pertaining to the growth of the digital economy is characterized by incompleteness and inconsistency. The current state of institutions dedicated to digital economic growth is characterized by a lack of coherence, synchronicity, transparency, and constructive measures, resulting in several deficiencies. In addition to the notable accomplishments, it is worth noting that our nation's digital economic institution has yet to fully optimize its operations. Details: Firstly, regulations often cannot keep up with the rapid digitalization of the economy, there is a gap between legal rules and actual implementation, and there is no legal corridor for pilot implementation. Apply new business and service models. This can be clearly seen through disputes between traditional taxis and technology taxis or the growing trend of online shopping, but with many potential risks because it is impossible to check the quality and origin of products. It is difficult for consumers to identify contacts to complain and seek compensation. Second, regulations on database protection, personal data, and private information are still incomplete. Individual rights and ethics issues are being addressed when applying artificial intelligence, digital identification, and electronic authentication for people. Third, the legal framework is not yet synchronized on e-government construction, and the mechanism to ensure the implementation of e-government building tasks is not strong enough, so the results of implementing many e-government tasks are also poor and slow, and in many places, performance is still formal. Fourth, there is no mechanism to minimize negative impacts and no genuinely effective management apparatus to prevent commercial fraud, tax evasion, and fake and harmful information. Fighting crime and ensuring network security still has many challenges.

(3) Investment in digital infrastructure influencing the digital economy at a significance level of 0.01 in Table 2, and the same results [21, 23, 28]. The infrastructure supporting the process of digital transformation continues to exhibit several constraints. The pace of the digital transformation process is hindered by a lack of proactive measures, mostly due to the constrained infrastructure supporting this process. The completion of institutions and legislative rules pertaining to digital transformation and digital economic activity in Vietnam is perceived to be progressing at a sluggish pace. There exists a deficiency in the legal framework pertaining to the implementation of novel business and service models. Investment in digital infrastructure is still modest, especially since IT infrastructure is still in separate and independent construction, thus not ensuring service continuity. Database sharing between ministries/sectors is not synchronized because each ministry/sector uses its own server and data management system, leading to national data inconsistency. Telecommunications and IT infrastructure systems are still slow in speed and do not meet the requirements for developing the Internet of Things (IoT), smart cities, automated vehicles, and intelligent manufacturing. With the rapid explosion of the Internet, connections have been created between people, between people and things, and between things. Therefore, the amount of data is entering an explosion phase. The sharp increase in global data growth has led to the concept of Big Data. Data is increasingly becoming a strategic asset, the strength of businesses and countries. If we compare the role of land and labor resources in the agricultural age or technology and capital in the industrial age, data becomes the most critical production factor in the digital economic age, promoting green economic growth.

(4) Raise awareness of the entire society about digital transformation influencing the digital economy at a significance level of 0.01 in Table 2, and the same results [34, 39, 42]. The current digital change in Vietnam in general and businesses in particular in the context of the Covid-19 epidemic is very positive and remarkable. However, many companies and people are falling into the digital transformation trap when they have only partially applied technology but mistakenly think they have completed the digital transformation roadmap. This shows that to accelerate the successful digital transformation process, it is necessary to first raise people's awareness about digital transformation, especially in remote areas. Along with that, there are elements of technology, means, and techniques. To successfully transform digitally, it is first necessary to transform awareness and thinking about each person's traditional way of living and working that has been shaped. People are the center, subject, goal, and driving force of digital transformation. Therefore, each person needs to be trained, raise awareness about digital transformation, and universalize digital skills to effectively transition from the real world to the digital environment. This is the most important and fundamental task and solution that needs to be implemented in the national digital transformation process.

(5) Technological innovation influencing the digital economy at a significance level of 0.01 in Table 2, and the same results [35, 49, 50]. Strong development of science and technology, innovation, and digital transformation is considered the main driving force of economic growth in the current period. The results of analyzing the theoretical basis of discussion and practice on strengthening economic growth based on science and technology, innovation, and digital transformation serve as a basis to confirm that this is a new and vital driving force for economic growth, strengthening green economic growth and sustainable development. Theoretically, economic growth models affirm that increasing productivity by applying scientific and technological research, innovation, and digital transformation drives growth, promoting each country's economic development and sustainable economy. Investment in research and development activities - central activities of science and technology development and innovation impact productivity through two channels: (1) The research and development will help create process innovation activities that allow existing products to be produced more efficiently and/or with better quality. (2) The development of absorptive capacity will be a condition for identifying, synchronizing, and exploiting innovation activities conducted by businesses and professionals in different units, leading to improved productivity. At the same time, the digital transformation process, placed in the context of the current Fourth Industrial Revolution, is one of the critical factors supporting greater access to information and research and development cooperation opportunities, thereby creating job opportunities, skills transfer and efficiency, and greater transparency in countries' politics and business.

Numerous empirical studies have been conducted to explore the correlation between digital transformation and green growth. These studies predominantly concentrate on the macroeconomic level, including provinces, cities, and nations. The existing literature frequently concurs that digital transformation facilitates the advancement of environmentally friendly innovation and economic expansion, offering macro-level substantiation. However, there is a dearth of empirical proof at the micro-level. The practical significance and theoretical worth of the simultaneous development and interconnection between the digital economy and green growth lie in their ability to offer novel evidence for guiding decision-making and formulating innovative policies throughout the new normal period.

The digital economy and green growth are the path to recovery after the Covid-19 pandemic, and they help Vietnam strengthen its resilience to external shocks and ensure long-term sustainable development goals. Moreover, the green economy is a sustainable economic development model that now aims at the main environmental goal and provides economic and social goals. Reality has proven that applying the green growth model helps realize the dual goals of economic growth and environmental protection. A study has shown that the group of developed countries achieved the absolute dual goal with the leading contribution from technological progress, then economic structure and growth model. Therefore, to have multi-dimensional and general perspectives, researching digital economy and green growth to contribute to building a long-term strategy on green growth will have many essential meanings in learning, apply to the specific situation of Vietnam's socio-economy flexibly and effectively, and thereby well implement the Green Growth Strategy in Vietnam.

5- Conclusions and Policy Recommendations

5-1- Conclusions

The digital economy refers to a gradual and ongoing process of digital transformation at the national level, which occurs over an extended period. Digital technology may be utilized by individuals, businesses, and many fields to enhance their job performance and perhaps achieve significant advancements that can positively impact the quality of their output. The digital economy has been shown to have a positive impact on worker productivity and the promotion of sustainable, environmentally friendly growth. Digital economic transformation is an inevitable trend in the current context of rapid scientific and technological development. Not an exception to that trend, Vietnam has made practical efforts and actions to promote digital economic development in recent years. Developing the digital economy in Vietnam has initially brought many experimental results; however, practical requirements also pose some existing problems, requiring Vietnam to have determination and practical solutions that are more useful. Based on the research results

above, the article aims to find five critical factors affecting the digital economy and its impacts on green growth. The writers provide policy proposals pertaining to the advancement of Vietnam's digital economy and the promotion of green growth. It is important to direct attention on policy recommendations pertaining to the digital economy since this approach facilitates sustainable and equitable growth by prioritizing knowledge over resources. The affordability of engaging in the digital economy has resulted in increased accessibility to business prospects for a wider demographic. The global nature of digital technology has the potential to diminish the disparity between rural and urban locations. Digital technology offers novel methodologies and solutions to successfully address persistent issues, including environmental degradation, socioeconomic inequality, measurement of social sentiment, and citizen engagement in policy formulation. Besides positive results and opportunities for accelerating digital economic development, Vietnam also faces some challenges that need to be resolved. Among them, there are outstanding issues of legality, network security, lack of quality human resources and investment, deployment of information technology applications, raising awareness of digital transformation, and researching innovation in digital transformation; the following are policy implications that need to be implemented.

5-2- Policy Recommendations

According to the assessment of experts and the results of testing factors, to develop the digital economy, focus on the following contents:

First, improve the quality of digital human resources with an average value of 3.4018; the standardized estimate is 0.195 with sig. 0.005 in Tables 1 and 2. Therefore, Vietnam needs to build an education and training strategy that directly serves the development of the digital economy. The Ministry of Education and Training should coordinate with specific ministries and branches between businesses, universities, and research institutes to forecast labor demand. At the same time, build a digital training program focusing on training information technology knowledge, telecommunications, and skills to apply digital technology in production labor for students from the university level. The university should build digital learning materials systems and digital libraries to help promote the ability of learners and researchers to self-study and access intellectual information. The university should change its programs, training content, teaching, and learning methods and improve lecturer qualifications to meet market needs. All forces participating in developing digital human resources must be proactive and actively promote their roles to be effective. The party and state orient, direct, and build favorable mechanisms for the digital transformation process. Organizations and businesses should be proactive and flexible in converting models and operating methods based on digital technology platforms. Each individual must voluntarily study and improve their professional qualifications, creating the ability to master science and technology applied to production labor and promoting the growth of the Vietnamese economy in the current period. Finally, enterprises need to build a labor culture for digital human resources. The 4.0 industrial revolution allows everyone to receive information quickly, but not all information is accurate and valuable, and many harmful information, anti-state ideologies, and false information cause disorientation in everyone's actions. Therefore, to strengthen the construction of a cultural working environment and create conditions and opportunities for human resources to develop, leaders must be exemplary in words and deeds. Human resource development strategies must be implemented in an environment of fairness, discipline, ethics, and respect for the law as standards; create a cultural background, leading the development of human resources.

Second, improve the perfect digital policies with an average value of 2.5571; the standardized estimate is 0.179 with sig. 0.001 in Tables 1 and 2. Therefore, Vietnam should improve the unified legal policies on digital technology to regulate fees for access to different data sets, such as land data, environmental data, remote sensor data, or map data. In the digital age, an era where data such as digital maps and satellite images are considered new factors of production, making this new factor of production secret is an unnecessary and restrictive measure that hinders the smooth flow of digital data between state agencies. This affects the ability of governments at all levels to issue timely and well-founded decisions, especially in areas such as urbanization and environmental pollution. In addition, it is necessary to implement policies on digital economic development more drastically. Besides, the government needs to pay special attention to improving policies and action programs to expand and create motivation for digital economy development. The National Assembly needs to strengthen supervision of the implementation of the law related to developing the digital economy and periodically summarize and evaluate implementation results. At the same time, they do an excellent job of guiding, supplementing, and amending the law so that it is more and more suitable to the actual conditions of our country's digital economy and international economic integration. In conclusion, it is imperative for the government to undertake a comprehensive evaluation, revision, and dissemination of fresh regulations and policies pertaining to data assets, data trading, and data services. This is essential in order to establish a robust, secure, and legally compliant data market. Additionally, it is crucial to engage in the formulation, submission for dissemination, and effective execution of the revised Electronic Transactions Law and its accompanying directives. This will ensure the complete recognition of the legality of electronic records, data, documents, and transactions. Furthermore, it is essential to establish a transparent legal framework for intermediary platforms involved in electronic commerce.

Third, improve the investment in digital infrastructure with an average value of 2.6301 and a standardized estimate of 0.131 with sig. 0.009 in Tables 1 and 2. Therefore, in order to maintain a competitive edge and achieve rapid development in the realm of core technology, it is imperative for Vietnam to persist in investing in and constructing digital infrastructure. The proposal entails the establishment of a comprehensive and coordinated nationwide digital infrastructure that can fulfill the necessary criteria for connectivity, data storage, and data processing, as well as facilitating monitoring functions. Additionally, it aims to guarantee network security and safety measures are in place. It is vital to persistently advocate for the advancement and establishment of superior broadband infrastructure. In order to align with global trends, it is imperative to enhance the existing 4G mobile network and advance the development of the 5G mobile network. The objective is to guarantee that both enterprises and people have convenient and unrestricted connectivity to high-speed Internet services. The approach to ensuring connection should prioritize inclusivity by aiming to universally deliver high-speed broadband fiber optic internet to all households, provide cloud computing services to every agency and business, and make technological advancements like 4G and 5G accessible to all citizens. In order to provide adequate resources for digital infrastructure, it is imperative to incentivize the active involvement of all economic sectors possessing the requisite capacity for investment. However, it is crucial to exercise caution and consider sensitive domains pertaining to national security. Furthermore, it is imperative to expeditiously enhance and finalize the digital platform in order to streamline administrative processes. The implementation of e-government has the potential to enhance the effectiveness of public services and facilitate the growth of Vietnam's burgeoning IT-communications service sector. There is a need to promote the utilization of certain digital platforms for the purpose of digital government development, hence enabling private firms to leverage these platforms to enhance the overall value of the solution. Ultimately, it is important to recognize that both cybersecurity and network operations hold similar significance and should be seamlessly integrated into the infrastructure configuration. There exists a pressing necessity to augment the quantity of secure servers and enhance cybersecurity skills to effectively surveil and mitigate online assaults. Vietnam should prioritize enhancing international collaboration about data flow security, mitigating obstacles to both domestic and foreign e-commerce, and addressing the rights and concerns of its residents regarding privacy and data preservation.

Fourth, improve the raise awareness of the entire society about digital transformation with an average value of 3.1005 and a standardized estimate of 0.146 with sig. 0.001 in Tables 1 and 2. Therefore, the government needs to raise awareness and improve economic management skills in digital economic conditions. Expanding propaganda about the role and positive impact of the digital economy is necessary. If information technology is the driving force of the digital economy, then education and training are the keys to information technology. Along with developing information technology, the digital economy must protect economic, information security, political, cultural, and national safety, network security, and cyberspace. Supervise and prevent high-tech crimes in all industries and levels, especially finance, currency, and digitized government agencies. In the era of agricultural and industrial economics, human resources do not require high-level knowledge, but in the digital era, digital knowledge has become a mandatory ability for human resources. Human resources need to be provided with dual skills: digital and professional skills. When they do not have digital knowledge at a basic level, they considered "illiterate" in the digital era. Therefore, understanding digital technology is one of the basic human resources requirements in the digital era; it is an equally important competency as listening, speaking, reading, and writing skills. Finally, in the coming time, it is necessary to promote propaganda to raise awareness among the entire society about digital transformation and digital economic development so that state management agencies, people, and businesses clearly understand the benefits, thereby actively participating and enjoying the benefits that digital transformation brings with the view that people and businesses are the center, the subject, the goal, the driving force, and the resource of transformation change number. Only then will the digital transformation be universal and comprehensive so that digital technology and digital platforms are present in every household and every activity of every person. The objective is to foster innovation in management thinking and enhance economic management capabilities. The primary impediment to the process of digital transformation is not the availability of financial resources or technological advancements, but rather the level of knowledge and understanding exhibited by organizational leaders. The transition to a digital platform necessitates the restructuring of the business model as well as the adaptation and development of individuals inside the organization, and human resource change holds the utmost significance. Digital transformation facilitates the integration of individuals and technological systems, resulting in the establishment of a cohesive ecosystem. Hence, it is imperative that leadership capacity building is concomitant with the process of digital transformation.

Finally, improve the technological innovation with an average value of 3.5160; the standardized estimate is 0.117 with sig. 0.009 in Tables 1 and 2. Therefore, enterprises that are undertaking digital transformation must adopt a proactive approach to capitalize on opportunities, enhance their business models, integrate digital technologies, foster the advancement of digital-based production and business solutions, actively engage in the global supply chain, and enhance their management capabilities in line with emerging production, business, and collaboration paradigms. Simultaneously, it is imperative to bolster the capacity of enterprises to engage in green innovation by enhancing associated systems and mechanisms. This includes the implementation of green procurement practices, the establishment of green procedures, and the facilitation of the transformation of innovation accomplishments into green technology. The overarching objective is to augment the rate of return on green technology innovation and invigorate the enterprise's enthusiasm for

engaging in green technology innovation. To facilitate digital transformation and green innovation, it is imperative to capitalize on opportunities for cost reduction both internally and externally, foster specialized roles within organizations, and establish a strong connection between digital transformation and green innovation within business strategies. This will enhance corporate social responsibility and contribute to the widespread influence of digital transformation and green technology innovation. Moreover, enterprises are consistently engaged in the process of innovation, undergoing digital transformation, and actively promoting innovation within the framework of digitalization. This entails recognizing the necessity for innovation, projecting the ability to innovate, and developing groundbreaking policy measures to sustain the momentum of innovation within the digital landscape. The aim is to ensure the coherence and agility of practical organizational structures in order to align with the present state and potential for innovation. Focus on examining the cooperative capabilities between domestic and foreign companies, specifically in the context of theoretical research agencies. This investigation will explore the role of leadership, functional management, and business agencies in facilitating effective cooperation. Finally, businesses also need to raise awareness and understand properly and comprehensively both the benefits and challenges of innovation in digital transformation and the environmental impact of digital economic development prerequisites for sustainable development. There is the best preparation for leaders at all levels in state management agencies, industries, localities, and the business sector, mainly medium and large enterprises, to integrate these development trends, small and super small. Different parts of the digital economy will have environmental impacts at different levels, so key digital enterprises play a leading role in developing several telecommunications and information technology enterprises. Leading digital technology infrastructure as the foundation for the digital economy and digital society needs to be associated with ensuring environmental requirements.

5-3- Limitations and Further Research

With the research results presented above, the article has systematized domestic and foreign research results on the digital economy and green growth. Besides, through studying the theoretical basis, the study has proposed a research model suitable for the current context of Vietnam. Through that, the research has resolved several problems based on the current situation of surveying experts and other subjects in economics and management. This has been explained explicitly in the article by analyzing the impact of certain factors on the digital economy and green growth in Vietnam. However, with the successes and achievements in the above analysis, the study still conducted surveys in other provinces. The generalizability of the study will be higher if it is shown in many other towns and regions across the country. This research direction may open up future research to overcome the study's limitations and add other factors affecting the digital economy and green growth.

6- Declarations

6-1- Author Contributions

Conceptualization, N.Q.M., P.T.H.N., and L.T.D.; methodology, N.Q.M., P.T.H.N., and L.T.D.; formal analysis, N.Q.M., P.T.H.N., and L.T.D.; investigation, N.Q.M., P.T.H.N., and L.T.D.; writing—original draft preparation, N.Q.M., P.T.H.N., L.T.D., and O.B.; writing—review and editing, N.Q.M., P.T.H.N., L.T.D., and O.B. All authors have read and agreed to the published version of the manuscript.

6-2- Data Availability Statement

The data presented in this study are available in the article.

6-3- Funding

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6-4- Acknowledgements

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6-5- Institutional Review Board Statement

Not applicable.

6-6- Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

6-7- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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