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Results and Forecast of the Impact of Information Technology and Communication on the Vietnamese Economy

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RESULTS AND FORECAST OF THE IMPACT OF INFORMATION TECHNOLOGY AND COMMUNICATION ON THE VIETNAMESE ECONOMY

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Abstract

The relationship and level of impact of Information and Communication Technology (ICT) on economic growth and labor productivity enhancement have been a concern for many researchers in recent years. The article analyzes the relationship between ICT and economic growth; The direct contribution of the ICT industry to the Vietnamese economy; The ICT development trends of Vietnam until 2025.

Keywords: Information technology and communication, results, forecasts, ...

1. Introduction

Over the past three decades, the global economy has witnessed a strong development of ICT. ICT is closely associated with various new economic concepts such as the knowledge economy, digital economy, new economy, and new business models based on connectivity. The impact of ICT on the economy has been explained through various theories, such as the technology patterns theory and the general-purpose technology theory. Numerous quantitative studies have been conducted to measure the impact and causal relationship between ICT and economic development, in order to formulate appropriate ICT development policies for economic growth.

2. Main content

2.1. *The aspects of ICT's impact on the economy*

In practical terms, research analyzes and identifies the specific impacts of ICT on different aspects of the economy.

- *Macroeconomic aspect:* Information technology plays an increasingly important role in economic growth, investment, and various aspects of the economy. Nevertheless, assessing these impacts encounters difficulties in terms of measurement methods and the availability of statistical data for measurement.

- *Market and business aspect:* Due to the impact of ICT, e-commerce, online service provision, software, and information leads to changes in market structure and market competitiveness conditions. Many experts also point out that the Internet and e-commerce create significant opportunities for small businesses as they can easily participate in value chains, reduce transaction costs, and have higher potential to enter the global market. However, all of these arguments still lack the data for verification. From the market and business aspect, the impact of ICT is manifested through: (1). The relationship and interaction between the characteristics of technology, digital products, and markets with the structure and competition of markets; (2). Factors influencing prices, market structure, market efficiency, and competition; (3). The role of startups and small businesses; (4). The extent of the impact of the Internet and e-commerce on small and medium-sized enterprises (SMEs).

- *Employment aspect, workforce, and participation:* ICT, when transforming the global economy, also leads to changes in the workforce in terms of quantity, composition, knowledge, and skills required for success. The competitiveness of nations and companies increasingly relies on the ability to attract, recruit, and retain talented technology professionals with suitable skills. The development of ICT has caused temporary unemployment issues as workers have not quickly adapted to new requirements. ICT can also

lead to a digital divide, due to uneven access of workers to the digital economy, thereby resulting in social inequalities.

- The aspect of organizational change: Due to the use of ICT and the transformation of business production processes, eliminating physical constraints, it also alters the relationships among suppliers, customers, competitors, and all of these will result in organizational changes and changes in organizational culture. Studies on organization need to reconsider their understanding of ICT. ICT is not just an asset or a conventional technology; it is a driving force that brings about a complete transformation in the way businesses are organized.

2.2. The direct contribution of the ICT sector to the Vietnamese economy

ICT is a small economic sector in terms of its contribution to the total GDP of the economy. Within it, the hardware manufacturing industry achieves an average contribution level. The contribution of the ICT service sector, particularly the telecommunications and ICT content industries, to GDP is insignificant. However, theory suggests that the impact of the ICT sector is significant in terms of its spillover effects and stimulation of other industries. Therefore, despite its relatively small contribution in terms of output, ICT can still have a substantial economic impact.

In terms of cost structure, the ICT hardware sector significantly relies on intermediary costs rather than generating substantial value-added. For all three sectors, the proportion of value-added created tends to decrease noticeably over time. In terms of consumption structure, the telecommunications and content sector primarily serves intermediate needs (business consumption for production by other sectors), which has been rapidly increasing over time, indicating the growing extent of ICT's spillover into the production and operations of other economic sectors. This is a manifestation of the digital transformation process in Vietnam. Although the ICT hardware manufacturing industry has a positive trade balance, its export turnover is significant. This reflects the nature of Vietnam's processing, raw material import, and re-export activities in this sector of the economy.

When examining the economic stimulation impact of Vietnam's ICT industry through employment effects, the results indicate that the multiplier effect of the ICT sector is quite significant, with the highest impact observed in the ICT manufacturing sector. When comparing the output multiplier coefficients of various economic sectors, both the ICT hardware manufacturing sector and the ICT services sector exhibit higher impact levels than the average for the economy. However, these coefficients tend to decrease over time. This is an unfavorable sign, indicating that the diffusion of ICT has been slower in recent years. Thus, ICT stimulates other industries more through the consumption of their products and services rather than through providing inputs to these industries. This is a less desirable outcome according to the economic impact theories of ICT. Regarding the "domestic" spillover effects of the ICT sector, the order and spillover impacts of various ICT sectors in the economy are reversed, with the highest impact observed in the ICT communication and content sector and the lowest impact observed in the ICT hardware manufacturing sector.

Therefore, despite hardware manufacturing being the sector with the largest contribution to the total output of the economy, its spillover effects, particularly when considering imports separately, are the lowest among all sectors in terms of their impact on the economy. This is the typical characteristic of an economy at the end of the value chain, with limited value-added and limited impact on domestic production (Dang Thi Viet Duc, 2020).

If relatively compared to the multiplier coefficients of the ICT industry in some countries in the region, such as Malaysia at 1.64, Thailand at 1.38, and Indonesia at 1.68 (Irawan, 2013). It can be observed that the impact of increasing output in the ICT industry, both in Vietnam specifically and the ICT industry in general, is relatively high when the

import factor is not separated. However, it is not more prominent when the import factor is separated. This suggests the dependency on imports in the Vietnamese ICT industry. The results regarding the non-prominent position are also identified in certain countries such as Iran (Bazzazan, 2009), Croatia (Kecek, 2016) and Indonesia (Irawan, 2013). In contrast, ICT is identified to play a prominent role in other countries such as Indonesia (Ministry of communications and Information Technology of India, 2005), Thái Lan (Irawan, 2013), where the ICT services sector has a significant impact. Additionally, Singapore and Malaysia (Irawan, 2013), show a prominent influence of the ICT services sector.

When considering the value-added multiplier and the import multiplier, the ICT hardware industry clearly demonstrates itself as a prominent import-stimulating sector of the economy while having a limited impact on value-added. This further highlights the nature of the ICT hardware industry in Vietnam, which is primarily assembly-oriented. Despite its high production output, it has limited impact on stimulating value-added in the economy. Therefore, in a developing country like Vietnam with abundant low-skilled labor force, the industry can be suitable for addressing employment issues and utilizing opportunities to create additional value-added. However, in the future, if Vietnam can successfully shift to higher value-added stages in the ICT machinery and equipment value chain, the multiplier effect from value-added will be significantly greater.

The telecommunications and ICT services sectors have the potential to stimulate higher value-added utilization compared to the multiplier effect of imports and exceed the average level of value-added creation in the economy. However, this trend is increasingly dependent on imports over time in these two ICT sectors, which is a noteworthy consideration for policy makers to take into account.

When considering the industries that utilize the products and services of the ICT sector, it can be seen that:

- *Firstly*, the ICT industries self-consume their own products and services at a high level. In particular, the hardware manufacturing sector of the ICT industry has the highest level of intra-industry consumption. This reflects the closed nature of the hardware manufacturing sector within the ICT industry, and it also predicts a low level of industry spillover into the economy. The telecommunications and digital content sector has the lowest level of intra-industry consumption among the three ICT sectors.

- *Secondly*, non-ICT sectors predominantly consume ICT products and services in advanced service sectors such as wholesale and retail trade, finance, business scientific services, public services, and education. The increasing proportion of ICT cost over time indicates the level of digital transformation in this industry. Taking into account the factor of prices, specifically the lower inflation rate in the ICT sector compared to many other industries, it can be affirmed that the level of digital transformation in the Vietnamese economy is significant.

2.3. The development trends of ICT in Vietnam until 2025

The relationship and impact of ICT on economic growth and labor productivity have been a concern of many researchers in various countries in recent years. At the national level, studies assessing the impact of ICT on economic growth can be divided into two branches based on the research approach chosen:

- *First branch of research,* utilizes the growth accounting method to evaluate the contribution of ICT investment to GDP growth. The advantage of the growth accounting method is its ability to analyze the contribution of ICT, as well as other influencing factors, to economic growth and labor productivity in a specific and comprehensive manner for the entire economy. It helps overcome limitations in data availability over time due to the relatively limited number of years of observing ICT development. To calculate the contribution coefficients of the factors, researchers can employ either non-parametric or

parametric approaches. The non-parametric approach determines the contribution coefficients based on the proportion of eight contributions to the total value added. The parametric approach estimates the contribution coefficients through quantitative econometric techniques. The non-parametric approach must rely on certain strict assumptions about production technology (constant returns to scale), firm behavior (profit maximization), and characteristics of the technological process (Hicksian neutrality of technical progress). The parametric approach is not bound by such strict assumptions as mentioned above, but it is less flexible as the estimated contribution coefficients will be fixed. It requires more observations to perform and, in many cases, this is not feasible for assessing the impact of emerging sectors like ICT.

- *Second branch of research*, systematically evaluates the economic impact of ICT in Vietnam at the macro level in terms of economic growth and at the industry level in terms of production in other sectors of the Vietnamese economy. Research contributes at some points. First point, research has systematized the theories of ICT's impact on the economy, systematized impact assessment methods, and provided an overview of the economic impacts of ICT in various countries. Second point, research analyzes the ICT industry in Vietnam through statistical data collected from various sources, including the General Statistics Office, the Ministry of Information and Communications, and international sources. This allows for comparisons of the position of the ICT industry in Vietnam with other countries and comparisons of production and investment between the ICT industry and the overall economy.

- *Third point,* the research evaluates the direct impact of input factors in the ICT industry on Vietnam's economic growth using a growth accounting model. In addition to model deployment, the research makes a significant contribution to handling the scarce and inconsistent data of the Vietnamese ICT industry. Fourth point, the research evaluates the indirect impact and spillover effects of the ICT industry on other sectors within the overall Vietnamese economy using the Input-Output (I/O) analysis method. This is an important quantitative component that complements the assessment of direct impacts using the growth accounting model. Fifth point, the research forecasts the development of the Vietnamese economy and the ICT industry in the period 2019-2025, thereby predicting the impact of ICT on economic growth in the upcoming period.

The research results indicate that the impact of ICT on the economy is significant. Despite the limited direct impact, the spillover effect (indirect impact) of the ICT sector on other sectors of the economy is significantly stronger compared to other sectors. This can potentially increase the overall contribution to economic growth. Furthermore, the results also indicate that the ICT sector in Vietnam relies heavily on imports and has a stronger supply-side impact than demand-side impact. This will reduce the spillover effect of the ICT sector on the economy. Based on the analyses, assessments, and studies, some preliminary recommendations for the future development of the ICT sector in Vietnam have been proposed (by the Ministry of Science and Technology).

3. Conclusion

The continuous development of information technology and telecommunications holds great promise for the significant impact of ICT on businesses, markets, and the economy in the future. ICT is also seen as a technology that enables small, developing countries to leverage their potential in high-quality workforce and bridge the gap with developed nations, reducing the gap between them. However, keeping up with and applying the latest ICT advancements is also a challenge that businesses and policymakers in Vietnam must face.

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