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Driving Growth: The Role of Digitalization in Indonesia's Economy

Mendorong Pertumbuhan: Peran Digitalisasi dalam Ekonomi Indonesia

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Abstract

Economic digitalization has transformed various aspects of economic activities and plays a pivotal role in shaping the dynamic economic landscape of Indonesia. This study examines the impact of digitalization on Indonesia's economic growth from 2019 to 2023, measured through internet access, mobile phone ownership, e-commerce usage, and the ICT Index. Using panel regression analysis, the results show that internet access and mobile phone ownership significantly and positively affect economic growth, highlighting the importance of digital connectivity in boosting national productivity and economic efficiency. Conversely, e-commerce usage and the ICT Index have a significant negative impact, possibly due to unequal access, dominance of imported goods, and suboptimal digital infrastructure. These findings emphasize that digital transformation must be supported by equitable infrastructure distribution, improved access to technology, enhanced digital literacy, and adaptive government policies to drive sustainable and inclusive growth across Indonesia.

Keywords: Economic Growth, Digitalization, Indonesia.

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Abstrak

Digitalisasi ekonomi telah mentransformasi berbagai aspek kegiatan ekonomi dan memainkan peran penting dalam membentuk lanskap ekonomi Indonesia yang dinamis. Studi ini mengkaji dampak digitalisasi terhadap pertumbuhan ekonomi Indonesia dari tahun 2019 hingga 2023, yang diukur melalui akses internet, kepemilikan telepon seluler, penggunaan e-commerce, dan Indeks TIK. Dengan menggunakan analisis regresi panel, hasil menunjukkan bahwa akses internet dan kepemilikan telepon seluler berpengaruh signifikan dan positif terhadap pertumbuhan ekonomi, menyoroti pentingnya konektivitas digital dalam meningkatkan produktivitas nasional dan efisiensi ekonomi. Sebaliknya, penggunaan e-commerce dan Indeks TIK memiliki dampak negatif yang signifikan, kemungkinan disebabkan oleh akses yang tidak merata, dominasi produk impor, serta infrastruktur digital yang belum optimal. Temuan ini menekankan bahwa transformasi digital harus didukung oleh pemerataan infrastruktur, peningkatan akses terhadap teknologi, literasi digital yang lebih baik, serta kebijakan pemerintah yang adaptif untuk mendorong pertumbuhan yang berkelanjutan dan inklusif di seluruh Indonesia.

***Kata Kunci**: Pertumbuhan Ekonomi, Digitalisasi, Indonesia.*

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INTRODUCTION

It is crucial to understand that economic growth encompasses the expansion of a country's production capacity. The quantitative and qualitative increase in national production output will shift the production curve to the right. This growth will increase the amount of social output, which will ultimately contribute to the improvement of community welfare. This will make the economy more effective in meeting the needs of the population (Jurayevich & Bulturbayevich, 2020).

According to previous researches, it is argued that the world is entering a new era characterized by innovation driven by information and communication technology (ICT), the use of the Internet of Things (IoT), and digitalization (Dodgson *et al*., 2006; Edquist *et al*., 2021; Oliver, 2006). The way the economy does business is changing significantly as a result of this transformation (Aleksandrova *et al*., 2022; Parida *et al*., 2019). In recent years, this process has rapidly developed and encompasses almost every aspect of life (Brodny & Tutak, 2022). There is a strong and well-structured argument that digitalization contributes to economic growth (Bukht & Heeks, 2018). According to Kabongo & Okpara (2014), information and communication technology supports digitalization by encompassing any communication application or device, such as television, radio, smartphones, computers, networks software and hardware, satellite communication systems, and all associated apps. Digital technology has transformed the way businesses operate globally, from e-commerce to business process outsourcing (Solomon & van Klyton, 2020).

The proliferation of information and communication technology (ICT) has greatly boosted the efficiency of distributing resources, decreased costs of production, and stimulated increasing investment & demand in multiple economic sectors. In addition to playing a larger role in supporting economic growth through telecommunications services, the impact can vary depending on country/region's level of development (Habibi & Zabardast, 2020; Ward & Zheng, 2016). The digital economy, supported by high technology and integration with various industries, has opened new opportunities for digital transformation in the industrial sector. Compared to the traditional economy, technology, industry, and digital services play roles as drivers, stabilizers, and main movers (Zhang *et al*., 2022). Digital transformation has become one of the main drivers of economic development in various countries, including Indonesia, which is currently facing the challenge of inter-regional development disparities. As an archipelagic country with more than 17,000 islands, Indonesia has significant geographical and demographic diversity, which impacts the level of adoption and utilization of digital technology.

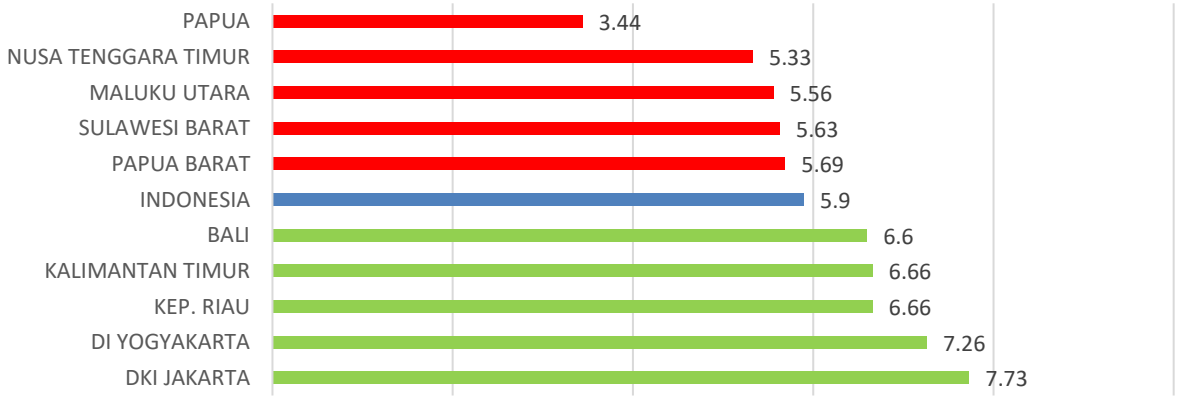


Figure 1. Five Provinces with the Highest and Lowest ICT INDEX in 2023
Source: BPS-Statistics Indonesia (processed), 2024.

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Access to the internet measures the affordability of digital resources for the community, which plays a role in enhancing economic inclusion and business operational efficiency (Liu *et al*., 2024). On the other hand, mobile phone ownership reflects broader access to digital communication and the use of technology-based services (Ma *et al*., 2020). The increase in internet access and mobile phone ownership will be accompanied by the use of e-commerce, which includes online buying and selling activities to support the growth of the business sector, whether micro, small, or medium (Amornkitvikai *et al*., 2022). Meanwhile, the ICT development index represents the level of readiness of a province to face digital transformation, which includes technological infrastructure, innovation, and human resource development that supports the digital economy (Appiah-Otoo & Song, 2021). These four variables interact with each other to influence economic growth through comprehensive and sustainable digitalization.

In Indonesia, digital technology utilization is imbalanced, with internet access exceeding 85% and mobile phone ownership above 70 percent in western provinces, while eastern regions like NTT and Papua remain below 80 percent and 70 percent, respectively (BPS-Statistics Indonesia, 2024). This disparity indicates that access to digital infrastructure, which is the foundation for the development of the digital economy, is not evenly distributed, thereby hindering its contribution to economic growth in underdeveloped areas (Oloyede *et al*., 2023).

E-commerce adoption averages below 30 percent outside Java compared to over 30 percent in Java, reflecting low ICT Development Index scores in eastern provinces compared to the western region, as seen in Figure 1. The disparity in access and adoption of digital technology has a negative impact on the ability of these provinces to drive economic growth (Liu *et al*., 2024).

Economic growth is the rise in an economy's production ability to provide services and goods, which is commonly measured through GDP (Xi & Wang, 2023). Endogenous growth theory emphasizes the significance of innovation, human capital accumulation, and technology in boosting economic production (Epicoco, 2021). Digitalization plays a crucial role in enhancing connectivity, data integration, and automation that contribute to economic growth (Ren & Lin, 2024). With the presence of technology spillover effects, the adoption of technology by one entity can benefit other entities (Mondejar *et al*., 2021). In addition, digitalization also accelerates the diffusion of innovation and creates new, more efficient business models (Wang *et al*., 2023).

Economic digitalization refers to the transformation of economic activities by adopting digital technology, such as IoT and e-commerce (Williams, 2021). Based on the Solow-Swan growth theory, technological advancement is the main factor in increasing labor productivity and capital efficiency (Amidi & Majidi, 2020). Access to the internet has become a key element in the digital economy, as it enhances connectivity and accelerates the exchange of information (Farrell & Newman, 2019). Several studies show that the internet has a positive impact on economic growth, especially in developing countries (Bahrini & Qaffas, 2019). In addition, mobile phone ownership also plays a role in driving digital economic activities, as explained in the theory of diffusion of innovation, which states that technology adoption is influenced by the community's need for communication and information (Haftu, 2019; Mbatha, 2024).

Another influential variable is the use of e-commerce and the Information and Communication Technology Development Index (ICT INDEX). According to transaction cost theory, e-commerce is capable of reducing operational costs by increasing the efficiency of information search and goods distribution (Hossain *et al*., 2022). However, in some contexts, e-commerce does not necessarily have a positive impact on economic growth, as found in developing countries (Toska & Fetai, 2023). ICT

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Index reflects a region's readiness to adopt digital technology and correlates with the development of digital infrastructure (Hasan *et al*., 2022). Based on capability theory, the development of digital infrastructure without an increase in human resource capacity can lead to economic disparities (Adeleye & Eboagu, 2019). Therefore, the equitable distribution of digital infrastructure and the enhancement of digital literacy are important factors in optimizing economic growth benefits of digitalization (Das & Chatterjee, 2023).

The novelty of this study is that it comprehensively analyzes the impact of economic digitalization on economic growth at the provincial level in Indonesia, unlike previous studies that focus more on the national or global scale without considering regional differences. In addition, research that comprehensively incorporates specific variables such as internet access, mobile phone ownership, e-commerce usage, and ICT development index is still limited, especially in the context of Indonesia which has geographical diversity and different levels of digital development. This research gap provides an opportunity to analyze in more depth how digitalization factors contribute to economic growth at the provincial level.

This research plays an important role in understanding the relationship between digitalization and economic growth in Indonesia. By analyzing the impact of internet access, mobile phone ownership, e-commerce usage, and ICT Development Index on economic growth in 34 provinces over the period 2019-2023, this study is expected to provide new insights into the role of technology in driving economic development. The findings are expected to form the basis for more effective policy formulation in accelerating digital transformation, expanding economic inclusion, and improving regional competitiveness. In addition, the study also aims to identify digital gaps between provinces that can be the focus of government intervention to create more equitable and sustainable economic growth across Indonesia.

LITERATURE REVIEW

Economic growth is the process of increasing the capacity of an economy to produce goods and services, measured through indicators such as gross domestic product (GDP). The endogenous growth theory explains that innovation, human capital accumulation and technology, are the main drivers of economic productivity (Epicoco, 2021). In the context of digitalization, information and communication technology (ICT), plays a crucial role in creating efficiency, expanding market access, and accelerating the diffusion of innovation, which ultimately leads to increased economic output (Wang *et al*., 2023). According to the technology spillover theory, digitalization also brings positive spillover effects that support economic inclusion and reduce inequality through improved access to services (Mondejar *et al*., 2021; Ren & Lin, 2024).

Economic digitalization is the transformation of economic activities through the adoption of digital technologies such as the Internet of Things (IoT), e-commerce, and internet-based telecommunications devices (Williams, 2021). In the Solow-Swan's economic growth theory, technological advancement is an important factor in driving economic growth through increased labor productivity (Amidi & Majidi, 2020). One of the main aspects of digitalization is access to the internet, which according to network theory, it can enhance economic connectivity (Farrell & Newman, 2019). Research by Bahrini & Qaffas (2019) shows that internet usage contributes positively and significantly to economic growth, especially in developing countries.

The ownership of mobile phones has become another important indicator in the digital ecosystem. Based on the Rogers' theory of diffusion of innovations (1962), the spread of

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technological devices such as mobile phones enable society to access various digital services, accelerates economic activities, and supports financial inclusion (Mbatha, 2024). Haftu's research (2019) supports this by finding that mobile phone penetration is positively correlated with GDP per capita. In addition, the use of e-commerce by entrepreneurs helps reduce transaction costs according to Williamson's (1981) transaction cost theory, expands markets, and creates efficiency (Hossain *et al*., 2022). However, Toska & Fetai (2023) found that in some developing countries, e-commerce has not yet shown a significant contribution to economic growth.

The ICT Development Index (IPTIK) reflects a region's readiness to face digital transformation. Based on Sen's capability theory (1999), ICT development encourages active community participation in the digital economy (Hasan *et al*., 2022). This index is also closely related to digital infrastructure such as broadband networks, data centers, and digital literacy, which form the foundation for technology-based economic growth. The development of ICT significantly drives economic growth in Africa (Adeleye & Eboagu, 2019). However, the equitable distribution of infrastructure and the readiness of human resources remain the main challenges in ensuring that the benefits of digitalization can be felt evenly (Das & Chatterjee, 2023).

METHOD

This research uses quantitative research methods. The quantitative research method is a systematic approach that utilizes numerical data to analyze phenomena, allowing researchers to measure variables and generalize findings from a sample to a larger population (Mohajan, 2020). The numerical data in this research uses secondary data, which is data obtained or sourced from third parties or by others. The data source used in this research was obtained from the BPS-Statistics Indonesia (https://www.bps.go.id/id).

The panel data regression method is also used. The panel data method is a statistical technique that analyzes data containing research over time with the same subjects and combines time series and cross-sectional data (Wang, 2022). Therefore, this research uses 34 cross-sections over a period from 2019 to 2023, or five years. The panel data regression method has three models, namely the fixed-effect, random-effect, and common-effect, which can help understand how independent variables affect the dependent (Dukalang & Ningsih, 2024). To determine which model is best used in this study, Chow test, Hausman test, and LM test are employed.

The independent variables used include the percentage of internet access (X1), the percentage of phone ownership (X2), the percentage of businesses using e-commerce (X3), and the ICT development index (X4), while the dependent variable uses the economic growth rate (Y). The following econometric model has been found:

$$EG_t = \beta 0 + \beta 1 \cdot I + \beta 2 \cdot PO_t + \beta 3.EU_t + \beta 4 \cdot ICT_t + \epsilon_t \quad \text{..... (1)}$$

In the model, EG represents economic growth, defined as the increase in a region's capacity to produce goods and services sustainably, measured in percentage (Xi & Wang, 2023). I represents internet access, which is the percentage of the population using the internet compared to the total population, reflecting digital connectivity and opportunities to participate in the digital economy (Liu *et al*., 2024). PO refers to telephone ownership, which describes the level of access people have to communication-based technology services (Mbatha, 2024). EU represents e-commerce usage, measured by the percentage of entrepreneurs utilizing e-commerce from the total number of entrepreneurs, reflecting the adoption of technology in the trade sector (Hossain *et al*., 2022); and, ICT stands for information and communication technology, which is a composite indicator that

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measures the level of digital readiness of a region, which includes infrastructure, use, and human resource capabilities in the field of information and communication technology (Hasan *et al*., 2022). The four independent variables are used to analyze the impact of digitalization on economic growth between provinces in Indonesia. All data were obtained from BPS-Statistik Indonesia.

RESULTS

Best Model Selection Test

The Chow test determines whether two linear regression coefficients are equal by comparing the common effects model (CEM) and the fixed effects model (FEM). The criteria used are if the *p-value* > 0.05 then the CEM is selected; if the *p-value* < 0.05 then the FEM is preferred (Sun & Wang, 2022). Furthermore, the Hausman test is used to decide between the FEM and the random effects model (REM) for panel data with time-varying covariates (Kabaila *et al*., 2017). The criteria used are if the cross-sectional random *p-value* > 0.05 then the REM is selected; conversely, if the *p-value* < 0.05 then the FEM is applied.

Table 1 shows that the cross-section chi-square *p-value* is 0.000, indicating that FEM is more appropriate based on the Chow test. The random cross-section *p-value* is also 0.0000, confirming FEM as the best choice according to the Hausman test, and the Lagrange Multiplier Test is not necessary (Agus, 2009). The table also shows that the cross-section chi-square *p-value* is 0.000, indicating that FEM is more appropriate based on the Chow test. The random cross-section *p-value* is also 0.0000, confirming FEM as the best choice according to the Hausman test, and the Lagrange Multiplier Test is not necessary (Fernández-Val & Weidner, 2018).

Estimation Results of Fixed Effect Model

Table 2 shows some results of the regression analysis. The test results indicate that the R-squared value is 0.576675, which means that 57.67 percent of the economic growth rate across 34 Indonesia provinces is influenced by factors such as internet access percentage, phone ownership percentage, the proportion of businesses utilizing e-commerce, and the ICT index. The remaining 42 percent of the growth rate is a result of other variables which are not part of the model. Furthermore, the independent variables in this study account for approximately 46 percent of the variance in the dependent variable, according to the adjusted R-squared value of 0.456190, or 45.619 percent. The probability value from the test, represented by prob (F-statistic) in the FEM model, is 0.000000. This value is lower than the 0.05 significance level (α), and thus it can be concluded that the independent variables collectively have a significant impact on the dependent variable (Agus, 2009).

The obtained ecenometric model based on Table 2 shows that if there is an increase in the use of internet access, it can result in an increase in economic growth. Likewise, if there is an increase in mobile phone ownership, it can significantly increase the economic growth. On the other hand, the model identifies that if there is an increase in the use of e-commerce, it actually reduces economic growth. The model also shows that an increase in the ICT Index can significantly reduce the growth.

Tabel 1. Result of Best Model Selection Test

Test	Probability
Chow Test	0.000
Hasuman Test	0.000

Source: Secondary data (processed), 2025.

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Tabel 2. Result of Fixed Effect Model Estimation

Variable	Coefficient	Probability	Description
C	27.61921	0.0004	
Internet Access	0.798250	0.0000	Positive Significant
Phone Ownership	0.195946	0.0071	Positive Significant
E-commerce Usage	-0.077150	0.0401	Negative Significant
ICT Index	-17.23860	0.0000	Negative Significant
Prob. (F-Stat)	0.000000		Significant
R-squared	0.576675		
Adjusted R-Squared	0.456190		

Dependent Variable: Economic growth
Source: Secondary data (processed), 2025.

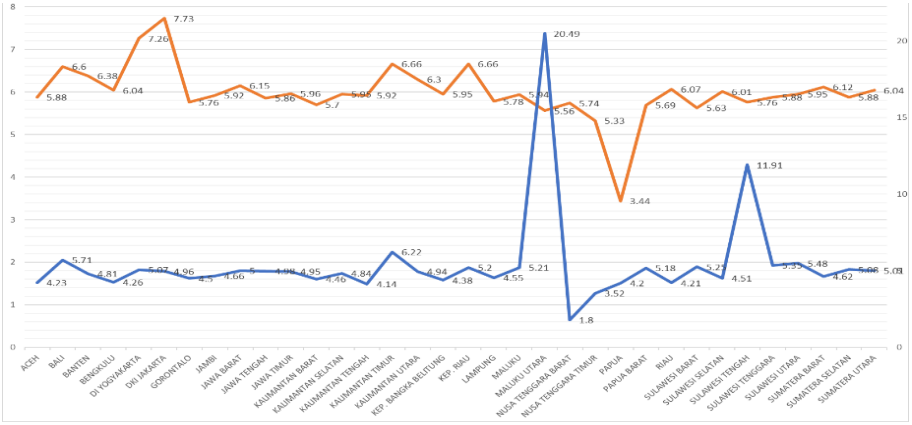


Figure 2. Economic Growth and ICT INDEX Year 2023
Source: Secondary data (processed), 2025.

The Condition of Economic Digitalization in Indonesia

Figure 2 illustrates the relationship between economic growth and the ICT Development Index across 34 provinces in Indonesia. Provinces with higher ICT Index values, such as DKI Jakarta (7.73), DI Yogyakarta (7.26), and Bali (6.60), generally achieve stable economic growth rates of 4.96 to 5.71 percent, indicating that advanced digital infrastructure significantly boosts economic activities. In contrast, regions like North Maluku, despite having a lower ICT Index (5.56), recorded the highest growth rate of 20.49 percent, possibly driven by sector-specific investments like mining or energy, which are less reliant on digital technology. Meanwhile, Papua, with the lowest ICT Index (3.44), experienced low economic growth (4.20 percent), highlighting how lagging infrastructure can hinder economic potential. These disparities suggest that the impact of ICT on growth is not uniform, varying by regional economic structure and resource dependency.

To maximize the benefits of ICT, development strategies should focus on equitable digital infrastructure distribution and enhancing community digital skills, particularly in underdeveloped areas. Government initiatives could integrate economic development with digital capacity building to achieve inclusive and sustainable growth. Programs such as digital literacy enhancement, internet infrastructure expansion, support for digital startups and SMEs, and the implementation of smart cities and digital financial services are crucial to fostering efficiency, financial inclusion, and equitable technology access across regions.

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Discusssion

The Impact of Internet Access Percentage on Economic Growth

The empirical results of this study indicate that internet access has a significant positive impact on economic growth. This indicates that the increase in the percentage of internet access drives economic growth by expanding digital business opportunities, improving communication efficiency, and facilitating the faster dissemination of information (Shehata & Montash, 2019). This result is in line with the literature that states that internet access can accelerate innovation, facilitate the integration of global markets, and increase productivity through digital transformation (Marel, 2021). In this era of globalization, the internet is an important factor in daily life. Especially in a country, particularly Indonesia, the internet is an important factor for disseminating information as well as supporting the activities of both service and goods companies. Wider access to the internet can increase productivity, accelerate the flow of information, and open up new economic opportunities, such as e-commerce and digital-based services.

It is thus reasonable to argue that the percentage of internet access exerts a significant positive effect on the rate of economic growth. The higher the percentage of the population with internet access, the greater its contribution to economic growth through enhanced efficiency and innovation. This is supported by the endogenous growth theory proposed by economists Paul Romer and Robert Lucas. This theory states that economic growth is not only determined by external factors, such as the accumulation of physical capital, but also by technological innovation and investment in human capital (Romer, 1990; Lucas, 1988). The findings are further corroborated by the research conducted by Adya (2024), which asserts that the proliferation of internet users exerts a positive and significant influence on economic growth in Indonesia, contributing 95.13 percent to economic growth influenced by the value of electronic commerce transactions and the growth of internet (Adya, 2024).

The Impact of the Percentage of Phone Ownership on Economic Growth

The empirical results of this study indicate that mobile phone ownership also has a significantly positive impact on economic growth. Mobile phones are essential tools for accessing digital services, including banking, education, and healthcare. The increase in mobile phone ownership expands digital inclusion and enables more individuals to participate in the technology-based economy, which collectively supports economic growth (Rahman & Sadik, 2024).

In this advanced era, phones are items that are almost universally owned by people around the world. The ownership of telephones, whether mobile phones or landlines, provides numerous benefits, one of which is the ability to enhance public access to faster and more efficient communication, expand economic connectivity, and support business and trade activities (Čihák, 2019). With the presence of telephones, economic actors can coordinate, share information, and access market opportunities more easily. Therefore, the percentage of telephone ownership has a significantly positive relationship with the rate of economic growth, as better connectivity supports increased productivity and economic activity across various sectors (Kurniawati, 2022).

This is supported by the theory of social capital, which states that phone ownership strengthens social capital by facilitating communication between individuals and groups. Better social relationships encourage cooperation, business collaboration, and information exchange, which ultimately enhance economic efficiency and growth (Ghahtarani *et al*., 2020). These results are also supported by earlier research conducted by Sanau (1998), which stated that a 10 percent increase in all mobile phones correlates with a 1 percent increase in GDP, while a similar increase in landline

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phones results in a 1.4 percent GDP increase, indicating a significant positive relationship between telephone penetration and economic growth (Sanau, 1998).

The Impact of the Percentage of Businesses using E-Commerce on the Economic Growth

The empirical results of this study indicate a significant negative relationship between the use of e-commerce by businesses and economic growth. This may reflect that the implementation of e-commerce has not been matched by a sufficient supporting ecosystem, such as logistics, digital security, and digital literacy in various regions (Ahi *et al*., 2023). These weaknesses can cause businesses using e-commerce to face high operational costs or distribution barriers, which ultimately hinder their positive contribution to economic growth.

Experts have begun developing the technology present in this world, one of which is the online marketplace or e-commerce. E-commerce is a technology that can connect sellers and buyers online without them having to meet face-to-face anywhere in the world, including Indonesia, where e-commerce has become widespread (Sufiyanto, 2022). With the presence of this technology, it can increase operational efficiency and expand the market for business actors (Akpan *et al*., 2022). Although e-commerce has various benefits, in some cases, the increased use of e-commerce by businesses can negatively impact the more dominant traditional sectors in the economy. The shift in consumption from local or informal businesses to e-commerce platforms dominated by large companies can lead to a decrease in the economic contribution of the local sector, job losses in the traditional sector, or increased dependence on imported goods (Chun *et al*., 2023). Especially in some provinces of Indonesia, there are still areas with suboptimal knowledge of technological innovations, such as in Papua Province. Therefore, the percentage of businesses using e-commerce can have a negative relationship with the economic growth rate in certain contexts.

This finding aligns with the theory of creative destruction propounded by Schumpeter (1942), which posits that rapid technological advancements can precipitate economic disruption, resulting in traditional businesses that are unable to compete with e-commerce enterprises experiencing a decline in productivity or even ceasing to operate, thereby exerting a negative influence on the rate of economic growth. This assertion is further corroborated by the findings of Adya (2024), which demonstrate that the value of e-commerce transactions does not exert a substantial positive influence on economic growth. This suggests that while e-commerce is expanding, its direct impact on the rate of economic growth may be relatively modest.

The Impact of the ICT Development Index on Economic Growth Rates

The empirical results of this study indicate that the overall ICT development index has a negative relationship with economic growth. This finding can be interpreted that although ICT has the potential to drive growth, in this context, significant investment in ICT development has not yet yielded optimal economic results. This can happen if ICT investment is uneven or not accompanied by human resource development, so the benefits of technology have not been widely and significantly distributed to enhance economic activities in various sectors (Kaplinsky & Kraemer-Mbula, 2022).

Information and communication technology continues to undergo innovation and more advanced development in this era of Industry 4.0 (Santos *et al*., 2018). With the development of ICT, it is hoped that it can drive economic growth in a country, including Indonesia, which continues to strive to develop its ICT so as not to fall behind other countries. However, in some contexts, the unbalanced development of ICT or its lack of integration with other economic sectors can have

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negative impacts (Aksentijević *et al*., 2021). Especially in Indonesia, which is a developing country that continues to strive for massive investments in ICT infrastructure without being matched by the enhancement of human resource capacity, optimal utilization, or the readiness of traditional sectors to adapt, can lead to inefficient resource allocation. Moreover, the development of ICT focused only on certain regions can widen the digital divide, which ultimately hinders overall economic growth (Grishchenko, 2020).

This is also in line with the theory of digital inequality, which states that uneven ICT development can exacerbate the disparity between advanced and lagging regions, thereby creating an economic gap that hinders national growth (Sujarwoto & Tampubolon, 2016). The results of this study are also in line with previous research conducted by Yugo *et al*. (2021), which states that the development of digital readiness in ICT, including ICT development, has a significant negative impact on economic growth in middle- and low-income countries. Conversely, it positively affects growth in high-income countries, highlighting the importance of adequate capital and labor.

The Relationship between Independent Variables

The regression results show a complex relationship between independent variables in influencing economic growth. The percentage of internet access and the percentage of mobile phone ownership, which have a significantly positive influence, complement each other in driving digital-based economic activities. Both create an inclusive digital ecosystem, enabling the community to access e-commerce, education, and banking services more easily. However, its effectiveness can be hindered by the low level of technology adoption among business actors (Eichler, 2022). For example, even though internet access is high, if business actors do not fully utilize e-commerce with a well-thought-out strategy, the contribution of digital technology to the economy becomes limited.

On the contrary, the ICT development index, which shows a significant negative impact, indicates that the development of technology infrastructure alone is not enough to drive economic growth. This requires integration with the quality of human resources and business readiness to utilize technology (Tusriyanto *et al*., 2023). The mismatch between investment in digital infrastructure and the ability of the community or business actors to utilize it productively can create a digital divide (Chen *et al*., 2024). Therefore, although internet access and mobile phone ownership contribute positively, the effects can weaken if e-commerce is not optimal and ICT development is not focused on enhancing users' capacity to make the most of the technology.

CONCLUSION

The study aims to examine the role of digitalization on economic growth rates in 34 provinces in Indonesia, and the results show that internet access and mobile phone ownership have a significant positive effect on economic growth, indicating that the expansion of digital connectivity can boost economic activity at the regional level. In contrast, e-commerce usage and the ICT development index show a negative significant effect, implying that digitalization has not been fully utilized productively in various regions. This could be due to low digital literacy, immature local digital ecosystems, or high reliance on external platforms that are less supportive of domestic economic growth.

These findings provide important implications for development policies, especially in optimizing the benefits of digitalization. The government needs to encourage the acceleration of digital infrastructure development, especially in underdeveloped regions and eastern Indonesia, as an initial step in realizing equal access. In addition, increasing digital literacy among the community and

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MSMEs is crucial so that technology can be utilized productively and sustainably. The development of local e-commerce and the integration of technology with traditional sectors are also important for creating an inclusive digital economic ecosystem. Regular monitoring and evaluation of digitalization programs need to be carried out to ensure their effectiveness on national economic growth.

This study is limited to four main digitalization indicators, analyzed only at the provincial level without considering sectoral characteristics or regional economic structures. The use of quantitative methods and secondary data also limits understanding of social and institutional dynamics, while the 2019–2023 timeframe does not capture long-term impacts. Future research should explore non-technical factors, sectoral analysis, and additional variables like education quality, innovation, and human capital investment to enrich findings.

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