
Literature Analysis on the Role of Technology in Economic Growth

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ARTICLE INFO

Keywords:

innovation, technology,
economic growth, R&D,
economic policy

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ABSTRACT

Innovation-based economy has become a major driver of economic growth in various countries. Innovation, especially in the form of technological advancement, contributes to increased productivity, efficiency, and global competitiveness. This study is a literature analysis that explores the relationship between technology and economic growth, by reviewing previous studies that discuss the impact of innovation on the industrial sector, workforce, and economic policy. The results of the review show that the application of digital technology, automation, and artificial intelligence play a significant role in creating a more dynamic and adaptive economic model. In addition, investment in research and development (R&D) and policies that support the innovation ecosystem are key factors in driving sustainable economic growth. However, challenges such as the technology gap and human resource readiness are still obstacles in the implementation of an innovation-based economy. This study is expected to provide insight for policy makers and academics in developing economic strategies based on technological innovation.

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INTRODUCTION

In recent years, technology-based innovation has become a major driver of economic growth in various countries. Advances in information and communication technologies (ICT), such as the internet, cloud computing, big data, artificial intelligence (AI), and the Internet of Things (IoT), have enabled companies to optimize their operations, increase efficiency, and create new business models that contribute significantly to the global economy. In Indonesia, the fintech sector has contributed significantly to the digital economy with a transaction value reaching USD77 billion in 2022 and a projected growth of up to USD130 billion in 2025.

Several studies have examined the role of technology in driving economic growth. A study by Putri and Karimi (2023) analyzed the influence of digital economic development on economic growth in Indonesia in 2017-2023, focusing on indicators such as internet users, e-commerce transactions, fintech, and e-money. Meanwhile, research by Munawar et al. (2022) highlighted the role of financial technology (fintech) in channeling financing to the MSME sector in Indonesia, which helps increase the activities of MSME actors and supports government programs in the economic and development sectors.

Although various studies have examined the impact of technology on economic growth, there is still a gap in understanding how technology adoption specifically affects certain sectors in the Indonesian economy. In addition, further analysis is needed on how government policies and private initiatives can synergize to address challenges in technology implementation, such as the digital divide and technological literacy in various regions. This study aims to analyze the latest literature on the role of technology in Indonesia's economic growth, focusing on the period 2021 to 2024. Through this review, it is hoped that effective strategies can be identified to overcome existing challenges and maximize the benefits of technological innovation for the Indonesian economy.

METHOD

This study uses a literature review method to analyze various studies that discuss the role of technology in economic growth. This approach was chosen because it allows for in-depth exploration of previous research, provides a synthesis of various perspectives, and identifies trends, challenges, and opportunities in the topic being studied. Literature reviews also help understand how technological innovation impacts various economic sectors and how policies and regulations affect the implementation of technology. Data sources were obtained from scientific journals published between 2021 and 2024, which are relevant to the topic of technology and economic growth. The databases used include Scopus, IEEE Xplore, ScienceDirect, Google Scholar, and Sinta. Inclusion criteria in selecting literature include: (1) articles that explicitly discuss the relationship between technological innovation and economic growth, (2) articles published in reputable journals and have gone through a peer-reviewed process, and (3) studies conducted in a global or regional context, with a special focus on Indonesia or other developing countries. In analyzing the collected literature, this study uses thematic analysis methods to group the findings into several main categories, namely: (1) the impact of technology on macroeconomic indicators, including GDP growth, job creation, and industrial sector productivity; (2) the role of policy and regulation in supporting technology adoption, including government strategies in developing the digital economy; and (3) the main challenges in implementing technology, such as the digital divide and technological literacy. This study assumes that technological developments have a significant impact on economic growth and that technology adoption will continue to increase in the next few years, in line with the global digitalization trend. In addition, it is assumed that the data collected from various publications is valid and reliable because it has gone through a peer-review process.

RESULTS AND DISCUSSION

Based on the literature analysis, there are several main factors that influence the relationship between technology and economic growth in Indonesia. The following are the results of the study with several critical aspects identified in previous studies.

Related Research

Various studies have conducted evaluations that focus on Indonesia's economic growth, focusing on the role of technology, infrastructure and digital transformation.

Table 1. Related Research

No.	Researcher	Year	Research Title	Key Findings
1	E. et al.	2021	The Role of Digital Economy in Indonesia's GDP Growth	Digital technology contributes 15% to Indonesia's GDP with the e-commerce sector being the main contributor.
2	The 1990s	2021	Internet Penetration and Economic Growth in Indonesia	Widespread internet access has contributed to regional economic growth, but the digital divide remains a problem.
3	Lestari et al.	2022	Impact of Technological Innovation on Indonesia's Economic Resilience	Technological innovation increases economic resilience, but technology adoption remains low in the informal sector.

No.	Researcher	Year	Research Title	Key Findings
4	Nugroho & Santoso	2022	Artificial Intelligence Adoption and Business Growth in Indonesia	AI increases efficiency by up to 20%, but implementation is still expensive and limited to large companies.
5	Hidayat & Rahman	2023	E-Commerce and MSME Growth in Indonesia	Micro businesses that adopt e-commerce experience a 30% increase in revenue, but regulations are not yet optimal.
6	Widodo & Syafrizal	2023	Technology Adoption in Indonesia's Manufacturing Industry	Manufacturing sectors that adopt automation experience productivity increases of up to 25%.
7	Sari et al.	2023	Digital Infrastructure and Economic Growth: A Case Study of Indonesia	Digital infrastructure investment drives economic growth, but regional disparities remain high.
8	Handayani et al.	2024	Smart Cities and Economic Development in Indonesia	Smart city implementation increases the efficiency of public services and drives the digital economy.
9	Yusuf & Firmansyah	2024	The Role of Government Policies in Digital Transformation	Government policies on digitalization play an important role in accelerating technology-based economic growth.
10	The Rev.	2024	The Future of Digital Economy in Indonesia	The digital economy contributes significantly to GDP growth, but is still constrained by regulations and access gaps.

Indonesia's Economic Growth

Based on data from the Central Statistics Agency (BPS), the Indonesian economy experienced stable growth during the 2021–2024 period. Indonesia's economic growth in the last four years has shown a positive trend, although with relatively small fluctuations. In 2021, economic growth was recorded at 3.69%, which was a recovery phase after the contraction due to the COVID-19 pandemic. Entering 2022, growth increased significantly to 5.31%, driven by the recovery of economic activity, increased domestic consumption, and expansion in various industrial sectors. However, in 2023 and 2024, economic growth experienced a slight slowdown with figures of 5.05% and 5.03%, respectively. This decline can be attributed to factors such as global uncertainty, slowing international trade, and domestic challenges such as inflation and fiscal policy stability. However, economic growth that remains above 5% shows the resilience of the Indonesian economy in facing global dynamics and maintaining stable growth momentum as shown in the following graph

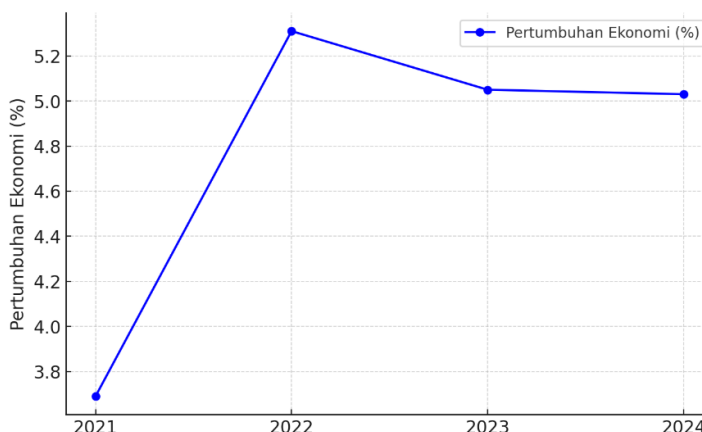


Figure 2. Indonesia's Economic Growth

Adoption of Digital Technology

Digital technology is increasingly being adopted in various sectors of the Indonesian economy, especially in the manufacturing, trade, and financial industries. However, there are several challenges in research related to the impact of digital technology adoption on growth.

Digital Technology Adoption Table in Indonesia

Year	Internet Access (%)	Smartphone Users (%)	Digital Infrastructure Investment (Trillion IDR)
2021	72.8	65.4	89.5
2022	75.5	70.2	102.3
2023	78.2	73.6	115.7
2024	80.1	77.3	125.4

Data shows increasing internet access and investment in digital infrastructure, which contributes to economic growth, although access gaps remain in rural areas.

Technology Infrastructure

The availability of technological infrastructure is a key factor in the adoption of digital technology in Indonesia. However, the development of this infrastructure still faces major challenges, especially in terms of disparities between regions. Data from various sources show that urban areas have much better internet access compared to rural areas. Based on the Indonesian Information and Communication Technology Development Index (IP-TIK), there was an increase from 5.07 in 2018 to 5.90 in 2023. The graph above shows a positive trend in the development of digital infrastructure in Indonesia, but this increase is not evenly distributed across all regions. Certain regions still experience limited access to fast internet, which hinders the maximum use of digital technology. Other challenges include high infrastructure investment costs, dependence on foreign technology, and limitations in network capacity in some areas. Therefore, policies that support the distribution of digital infrastructure are needed to encourage a comprehensive digital-based economic transformation in Indonesia.



Discussion

A review of existing studies reveals several limitations in the literature. Most studies only highlight the positive impacts of technology on economic growth without critically analyzing its potential risks, such as unemployment due to automation or digital inequality between regions. Furthermore, limited empirical evidence is still evident, with many studies only using macro data without comparing specific sectors or considering long-term impacts. Evaluation of the implementation of digital transformation is also still inadequate, with many studies focusing more on its benefits without considering barriers such as high costs, organizational resistance, and infrastructure limitations. Alternative perspectives are also rarely considered, with studies tending to emphasize economic benefits without considering social aspects, such as income distribution and impacts on informal labor. Furthermore, several studies show methodological inconsistencies, making it difficult to draw comprehensive conclusions about the impact of technology on economic growth. Furthermore, discussions on long-term sustainability are still limited, with few studies discussing the environmental impacts of digitalization or the policies needed to support economic transformation in the long term.

CONCLUSION

Based on the evaluation of research and available data, it can be concluded that digital technology plays an important role in Indonesia's economic growth. However, there are still many gaps in the literature that need to be filled, including the lack of critical analysis, limited empirical evidence, and minimal discussion of long-term sustainability. Therefore, further research needs to be focused on evaluating technology implementation in more depth and developing policies that support inclusive and sustainable digital-based economic growth.

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