

## Effects on Trade and the Economy from the Rapid Development of Technology in Indonesia

**Arnold Robert Rondonuwu, Dwi Fitria Rahmadani, Ni Wayan Meika Suardiani, Fabya Gabriel Injilio Mokodompis, Nicola Miroslove Leonel Longdong**  
Politeknik Negeri Manado, Indonesia  
Email: [arnoldrondonuwu@gmail.com](mailto:arnoldrondonuwu@gmail.com), [dwifitria2019@gmail.com](mailto:dwifitria2019@gmail.com),  
[niwayanmeika@gmail.com](mailto:niwayanmeika@gmail.com), [gabrielinjilio28@gmail.com](mailto:gabrielinjilio28@gmail.com), [nicolalongdong08@gmail.com](mailto:nicolalongdong08@gmail.com)

### Abstract

*The rapid development of technology has significantly transformed trade dynamics and economic growth in Indonesia. However, the benefits of digital transformation remain unevenly distributed across regions, creating a digital divide that hinders inclusive development. This study aims to analyze the disparity between internet penetration and its economic utilization, as well as to identify barriers faced by non-connected populations in participating in the digital economy. A mixed-method approach was employed, combining quantitative descriptive analysis of secondary data from the Badan Pusat Statistik (BPS) and the Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) (2025), with qualitative thematic analysis of policy documents and literature on digital inclusion. The findings reveal that although 80.67% of Indonesia's population are internet users, more than 55 million people remain unconnected, primarily in rural and remote areas. Furthermore, connectivity alone does not guarantee economic participation; limited digital literacy, inadequate infrastructure, low trust in digital financial services, and cultural barriers significantly impede the utilization of digital platforms for productive economic activities. The study also finds that existing policies tend to focus disproportionately on infrastructure expansion while neglecting capacity-building and community empowerment strategies. This research contributes to the formulation of more comprehensive digital development policies by emphasizing the necessity of integrating infrastructure investment with digital literacy programs, MSME empowerment, and social inclusion frameworks. The findings imply that bridging the digital divide requires a multidimensional approach that addresses not only access but also skills, trust, and institutional support to ensure sustainable and equitable digital transformation in Indonesia.*

**Keywords:** Technology; Economy; E-commerce Platforms; Digital Payments.

### INTRODUCTION

Suarsa (2025) examined the impact of e-commerce on MSMEs in urban Java and found a significant contribution to revenue, but this was limited to urban areas. Kartiasih (2023) analyzed the digital divide between western and eastern Indonesia, focusing on infrastructure without examining economic utilization. Koswara (2024) investigated rural digital literacy in Central Java and found that device ownership was not directly proportional to productive capacity. Mumtaz (2025) evaluated the Palapa Ring policy and concluded that infrastructure development was not balanced by empowerment programs. Previous research was fragmented in terms of geography and focus, and there has been no comprehensive study analyzing the gap between internet penetration and economic utilization based on national data for 2025 using a mixed-method approach (Lukas & Hasudungan, 2023; Nurfaizah & Putri, 2025).

The urgency of this research is based on: (1) 55 million people still lacking internet access (APJII, 2025), which has the potential to create a digital underclass and deepen inequality; (2) national digital policy being biased toward infrastructure, while digital literacy and economic empowerment programs are only partially implemented, resulting in the phenomenon of infrastructural fallacy; (3) the 2030–2040 demographic bonus potentially turning into a demographic disaster if young people in underdeveloped regions are not equipped with

functional digital literacy; and (4) threats to the achievement of the SDGs, particularly gender equality, decent work, and reduced inequality.

The novelties of this research include: (1) the use of the latest data from Badan Pusat Statistik (BPS) and Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) (2025), which have not been widely analyzed in scientific publications; (2) a correction of the infrastructure-biased digital development paradigm through empirical evidence showing that connectivity does not automatically result in economic participation; (3) a mixed-methods approach that integrates quantitative analysis of population proportions and thematic analysis of policies; and (4) a conceptual framework for the transition from “digitalization” to “digital development,” emphasizing a balance between infrastructure, human capacity, local institutions, and social sustainability.

Technological development in the present era, which is advancing rapidly day by day, has greatly influenced all sectors—especially the economy and trade—across countries worldwide, including Indonesia (Ing et al., 2017; Lestari et al., 2024; Salam et al., 2018). The advancement of technology in Indonesia is currently still in the process of being globally strengthened, both in the economic and trade sectors.

The development of trade-related technology in Indonesia cannot be separated from changing times, which demand that all citizens keep up with rapidly progressing technological transformations. People’s needs and advances in information technology are closely interconnected. Economic development and rapid technological progress, both now and in the future, require companies to allocate resources effectively and efficiently in order to obtain accurate and precise information, which plays a very important role.

At present, the diffusion of technology in Indonesia remains uneven, particularly in rural or remote areas where the use of technologies such as mobile phones and the internet is still limited. As a result, many street vendors do not yet know how to sell through digital platforms and prefer to trade by moving from place to place. In contrast, in urban areas, most people already use mobile phones for daily activities and online selling, allowing consumers to purchase goods or food without leaving their homes.

From this comparison, it can be observed that the distribution of technology in Indonesia is not yet evenly spread, and this condition can affect the country’s economic and trade sectors.

This research aims to analyze the level of internet penetration and the digital access gap in Indonesia, identify factors inhibiting the utilization of the digital economy, promote the orientation of national digital development policies, and develop a strategic framework for inclusive and sustainable digital transformation. It explores the study of development communication and the digital economy, critiques the technodeterminism paradigm, and broadens the application of the capability approach in the context of digital transformation. It offers input to the Ministry of Communication and Digital, regional governments, technology industry players, and civil society organizations in designing targeted digital literacy policies, programs, and interventions. It also raises public awareness of digital complexity and encourages government and corporate accountability in realizing a just digital ecosystem.

It calls for a paradigm shift from infrastructure development to digital ecosystem development, encompassing affirmative action policies for digital platforms, consumer and personal data protection, fiscal incentives for MSME technology adoption, and the decentralization of digital policies that grant authority and resources to regional governments.

Digital transformation must be understood as a process of lifting people out of poverty and powerlessness—not merely as a technical achievement.

## **METHOD**

The research method used in this journal is descriptive. According to John W. Creswell (2013), descriptive research is a research approach (often qualitative) that aims to explain and describe phenomena, conditions, or events factually and accurately according to the actual situation. Creswell states that the characteristics of descriptive research include a focus on factual description, in-depth data collection, data interpretation, and a qualitative approach.

The data sources used in this journal are the Badan Pusat Statistik (BPS) and the Asosiasi Penyelenggara Jasa Internet Indonesia (APJII). The journal in this study is intended for population research. Population research can only be conducted on a finite population with a manageable number of subjects (Arikunto, 2010). According to Sukardi (2009), a population is all members of a group whether humans, animals, events, or objects—that reside together in a particular place and are intentionally targeted as the basis for drawing conclusions at the end of a study. The data collection method used is the census method. A census is a data collection technique conducted by recording the entire existing population (Maksum, 2012: 53).

According to Nazir (2029), analysis involves classifying, formulating rules, manipulating, and simplifying data so that it becomes easier to interpret. The data analysis in this study employs descriptive statistical techniques. Hadi (1995) states that by using statistics in research, data can be presented in numerical form that is accountable for drawing valid conclusions and making sound decisions. The data will be presented in a pie chart.

According to Hasan (2004), a pie chart is a circular data chart divided into sectors according to the data, where each portion of the total data is expressed as a percentage. In the analysis process, the researcher will use the following formula:

$$P = \frac{F}{N} \times 100\%$$

### **Information:**

- **P:** Percentage
- **F:** Individual Frequency
- **N:** Total Population

The limitations of this study include: (1) reliance on accurate secondary data from BPS and APJII; (2) the use of national aggregate data cannot capture variations in conditions at the subnational level; (3) the inability to analyze specific individual characteristics; (4) the failure to triangulate with primary field data; and (5) limited access to unpublished policy documents. These limitations encourage further research to conduct primary surveys and in-depth interviews at the local level.

Data analysis was conducted in two stages. The quantitative stage used descriptive statistics with the percentage formula  $P = F/N \times 100\%$  to answer the research questions regarding the level of internet penetration and the extent of digital access nationally. The qualitative stage used thematic analysis Braun & Clarke, (2006) through a process of familiarization, coding, theme discovery, and drawing conclusions to answer the research

questions regarding factors inhibiting the use of the digital economy and evaluating the orientation of national digital development policies. These two stages of analysis were coherently integrated to answer all research questions.

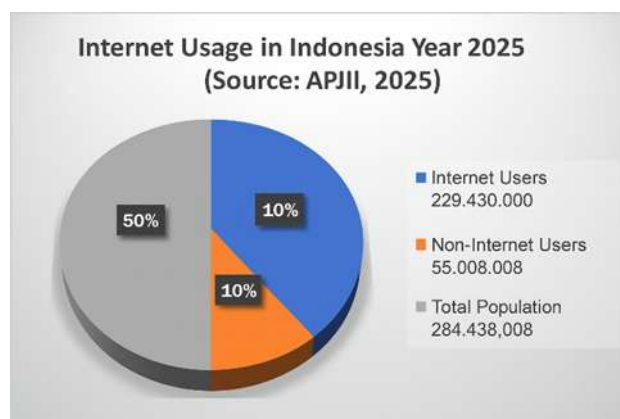
## RESULTS AND DISCUSSION

Based on the results of calculations using the formula:

$$P = \frac{F}{N} \times 100\%$$

According to the Central Bureau of Statistics of Indonesia (BPS), the total population of Indonesia in 2025 reaches 284,438,008 people. Of this total population, 229,430,000 people are internet users, while 55,008,008 people are non-users of the internet, based on data from the Indonesian Internet Service Providers Association (APJII, 2025).

The data are presented in the form of a pie chart to facilitate understanding of the proportion between internet users and non-users.



**Figure 1. Number of internet and non-internet users in Indonesia based on the total population for the respective year.**

Source: Data compiled from the We Are Social & Hootsuite report (Digital 2024) and BPS population projections.

The development of technology in today's modern era, which continues to advance rapidly each day, has become a major driving force behind transformation in various sectors of life, particularly in the economic and trade sectors. In Indonesia, the impact of technological advancement is strongly evident, especially in the areas of economy and commerce, although its distribution remains uneven across different regions of the country. Information and communication technology has changed the way people interact, transact, and conduct business, creating new opportunities as well as challenges that must be addressed collectively through effective and efficient strategies.

One of the most significant impacts of current technological development is the emergence of the digital economy. The digital economy refers to economic activities supported by digital technologies such as e-commerce, fintech, mobile applications, big data, and cloud computing. In Indonesia, this sector has grown rapidly among the population, particularly in major urban areas such as the capital city, Jakarta, where people have become accustomed to

using digital devices for their daily needs. Platforms such as Tokopedia, Shopee, and Bukalapak have become the main channels for shopping, transactions, and communication. Meanwhile, services such as Gojek and Grab facilitate transportation, goods delivery, and food ordering, making these applications essential tools for meeting public needs.

However, not all segments of society are able to fully benefit from these advancements. In rural and remote areas, limited digital infrastructure—such as internet networks and access to technological devices—remains a major obstacle. Many street vendors in these regions still do not understand how to sell through digital platforms unless individuals from larger cities come to teach them how to do so. Even then, many villagers continue to struggle with basic literacy skills, which further hinder the adoption of online selling methods. As a result, many rural residents still rely on traditional methods of selling.

The advancement of information and communication technology has become one of the main pillars supporting economic, social, and cultural development in many countries, including Indonesia. Based on data from the Badan Pusat Statistik (BPS) and the Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) (2025), Indonesia's total population has reached 284,438,008 people. Of this total, 229,430,000 people are internet users, while 55,008,008 people still do not have access to the internet.

Using the proportional formula:

$$P = (F/N) \times 100\%$$

where  $F$  is the number of internet users and  $N$  is the total population, the calculation yields:

$$P = (229,430,000/284,438,008) \times 100\% \approx 80.67\%$$

This indicates that approximately 80.67% of Indonesia's population is connected to the internet, while the remaining 19.33% still lack access. Although this percentage reflects a relatively high national level of internet penetration, it also highlights that more than 55 million people have not yet benefited from digital connectivity. Most of these individuals are likely to reside in rural, remote, or economically disadvantaged areas, or may lack the technological literacy needed to understand and utilize digital advancements.

The visual representation through a pie chart helps illustrate the proportion of internet users and non-users across Indonesia. In the chart, the grey segment represents the total population, the blue segment represents internet users, and the orange segment represents non-users. While the chart clearly shows that the majority of Indonesians are now internet users, the question remains as to why many people still cannot utilize this connectivity to strengthen Indonesia's economic development. This issue requires deeper study, particularly regarding how the government can engage more actively with communities—especially small vendors—to teach them how to generate income through digital platforms without relying heavily on physical labor.

The persistence of this digital divide indicates that technological development alone is insufficient to ensure inclusive economic growth. Connectivity must be accompanied by capacity building, institutional support, and community empowerment. Without these complementary factors, digital infrastructure risks becoming an underutilized asset rather than a catalyst for development. Therefore, addressing inequality in digital access requires a

multidimensional approach that integrates infrastructure development with education, policy reform, and social inclusion.

One of the primary barriers faced by rural communities is limited digital literacy. While mobile phones are increasingly common even in remote areas, many users lack the skills needed to utilize digital platforms effectively for economic purposes. This includes basic competencies such as creating online accounts, managing digital payments, and marketing products through social media or e-commerce platforms. Consequently, small traders and farmers often remain dependent on traditional supply chains, where intermediaries capture a significant share of profits.

To overcome this challenge, targeted digital literacy programs are essential. Community-based training initiatives supported by local governments and universities can help rural populations develop practical digital skills. For example, workshops on online marketing, product photography, and electronic payment systems can empower small vendors to participate directly in the digital economy. In addition, youth volunteers and university students can play an important role as digital ambassadors, assisting local entrepreneurs in adopting new technologies.

Infrastructure development also remains a critical factor. Although Indonesia has made progress in expanding broadband networks, connectivity quality varies widely between urban and rural regions. Slow internet speeds and unstable connections limit the effectiveness of online business activities. Continued investment in telecommunications infrastructure—including fiber-optic networks and satellite-based internet services—is necessary to ensure equitable access. Public–private partnerships can accelerate deployment while reducing the financial burden on the state.

Beyond infrastructure and literacy, access to digital financial services is another key determinant of economic inclusion. Fintech platforms offer opportunities for micro-entrepreneurs to access loans, savings products, and insurance without traditional banking requirements. However, trust in digital financial systems remains low among some segments of society, particularly older generations. Strengthening consumer protection frameworks and providing clear public information about digital finance can help build confidence and encourage adoption.

The role of government is central in creating an enabling environment for digital economic participation. Policies should prioritize support for micro, small, and medium enterprises (MSMEs), which form the backbone of Indonesia's economy. This includes simplifying business registration processes, offering tax incentives for digital adoption, and providing grants or subsidies for technology upgrades. Digital marketplaces supported by government agencies can also help local products reach wider markets, both domestically and internationally.

Education systems must adapt to prepare future generations for a digital economy. Integrating digital skills into school curricula from an early age can help reduce long-term inequality. Beyond technical competencies, students should also learn critical thinking, entrepreneurship, and ethical technology use. Vocational training programs aligned with industry needs can further enhance workforce readiness, ensuring that technological progress translates into employment opportunities rather than job displacement.

At the same time, technological advancement brings risks that must be managed carefully. Cybersecurity threats, online fraud, and data privacy violations disproportionately affect inexperienced users (Aswathy & Tyagi, 2022; Baladari, 2020). Rural communities, in particular, may be more vulnerable to scams due to limited awareness of digital risks. Public awareness campaigns and accessible reporting mechanisms are therefore essential to protect citizens and maintain trust in digital systems.

From a broader economic perspective, digital transformation has the potential to enhance productivity across sectors such as agriculture, manufacturing, and tourism. Precision farming technologies, for example, can help farmers optimize irrigation and fertilizer use, increasing yields while reducing costs. In tourism, digital platforms enable small hospitality businesses to attract visitors directly, bypassing traditional intermediaries. However, realizing these benefits requires coordinated efforts to integrate technology into sector-specific development strategies.

Cultural factors also influence technology adoption. In some communities, resistance to change or concerns about losing traditional practices may slow digitalization. Policymakers must therefore engage local leaders and respect cultural contexts when introducing new technologies. Digital tools should be positioned not as replacements for traditional livelihoods, but as complementary resources that enhance existing practices.

Gender disparities represent another dimension of the digital divide. Women in rural areas often have less access to technology and training opportunities, limiting their participation in the digital economy. Empowering women through targeted programs—such as digital entrepreneurship workshops and microfinance initiatives—can generate significant social and economic benefits. Evidence suggests that when women gain access to digital tools, household incomes and community well-being tend to improve.

Environmental sustainability must also be considered in the expansion of digital infrastructure. Data centers, mobile networks, and electronic devices consume significant energy and generate electronic waste. Integrating renewable energy sources and promoting responsible e-waste management can help ensure that digital growth does not come at the expense of environmental health. Sustainable digital development aligns with broader national goals related to climate resilience and green economic transition.

In the long term, Indonesia's digital economy strategy should emphasize inclusivity, resilience, and innovation. Rather than focusing solely on urban-centered growth, policies must address the needs of marginalized communities to ensure balanced regional development. This requires continuous monitoring of digital inclusion indicators such as internet access, digital skills, and online business participation rates.

International cooperation can further support domestic efforts. Knowledge exchange with other countries, participation in regional digital initiatives, and collaboration with global technology firms can accelerate capacity building. However, such partnerships should prioritize local empowerment and avoid creating excessive dependence on foreign platforms or technologies.

In conclusion, while technological development has significantly transformed Indonesia's economic and trade sectors, its benefits remain unevenly distributed. The digital economy offers vast potential to improve livelihoods and stimulate growth, yet millions of citizens are still excluded due to limited access, skills, and resources. Bridging this gap requires

an integrated approach that combines infrastructure investment, education, supportive policies, and community engagement.

By fostering digital literacy, strengthening MSMEs, expanding financial inclusion, and addressing social and cultural barriers, Indonesia can harness technology as a tool for inclusive development. Ultimately, the success of digital transformation should be measured not only by economic indicators but also by its ability to improve quality of life, reduce inequality, and empower all segments of society. When guided by thoughtful policy and collective action, technological advancement can become a powerful driver of sustainable and equitable national progress.

## **CONCLUSION**

The rapid development of technology is one of the key factors driving trade dynamics and economic growth in Indonesia today. Digital transformation has brought major changes across various sectors such as finance, public services, the creative industries, and even the education system. Although significant progress has been made, particularly in digital services and internet usage, the challenge of ensuring equal access to technology still requires serious attention from the government.

To address this issue, supportive and adaptive policies are crucial. The government needs to design regulations that promote a more equitable distribution of digital infrastructure. Examples include expanding internet network access to all regions of Indonesia—especially areas that have never been connected before—providing affordable telecommunication services, and developing technology centers across regions throughout the country.

## **REFERENCES**

- Arikunto, S. (2010). *Prosedur penelitian: Suatu pendekatan praktik*. Rineka Cipta.
- Asosiasi Penyelenggara Jasa Internet Indonesia. (2025). *Laporan survei penetrasi & perilaku pengguna internet Indonesia 2025*. APJII.
- Aswathy, S. U., & Tyagi, A. K. (2022). Privacy breaches through cyber vulnerabilities: Critical issues, open challenges, and possible countermeasures for the future. In *Security and privacy-preserving techniques in wireless robotics* (pp. 163–210). CRC Press.
- Baladari, V. (2020). Adaptive cybersecurity strategies: Mitigating cyber threats and protecting data privacy. *Journal of Scientific and Engineering Research*, 7(8), 279–288.
- Ing, L. Y., Hanson, G. H., & Indrawati, S. M. (2017). *The Indonesian economy: Trade and industrial policies*. Routledge.
- Kartiasih, F., Nachrowi, N. D., Wisana, I. D. G. K., & Handayani, D. (2023). Inequalities of Indonesia's regional digital development and its association with socioeconomic characteristics: A spatial and multivariate analysis. *Information Technology for Development*, 29(2–3), 299–328. <https://doi.org/10.1080/02681102.2022.2148694>
- Koswara, A., & Manajemen, M. (2024). Digitalisasi ekonomi di pedesaan: Mengkaji kesenjangan infrastruktur digital di Indonesia. *Jurnal Al Azhar Indonesia Seri Ilmu Sosial*, 5(3), 180–187.
- Lestari, A. P., Fatiha, S. A., & Putri, S. O. (2024). E-commerce in Indonesia's economic transformation and its influence on global trade. *International Journal of Computer in Law & Political Science*, 4, 10–23.

- Lukas, E. N., & Hasudungan, A. (2023). The impact of the digital divide on MSMEs' productivity in Indonesia. *International Research Journal of Business Studies*, 16(3), 241–252. <https://doi.org/10.21632/irjbs.16.3.241-252>
- Maksum, A. (2012). *Metodologi penelitian pendidikan*. Rajawali Pers.
- Mumtaz, A. A. (2025). *Implementation of public private partnership with DBFOM approach in Palapa Ring digital infrastructure development for sustainable national digital development* (SSRN Working Paper No. 5726582). SSRN. <https://doi.org/10.2139/ssrn.5726582>
- Nazir, M. (2029). *Metode penelitian*. Ghalia Indonesia.
- Nurfaizah, V., & Putri, N. W. (2025). Peran e-commerce dalam meningkatkan akses pasar bagi produk UMKM lokal di Provinsi Jawa Tengah. *Jurnal Intelek Insan Cendikia*, 2(9), 16645–16649.
- Salam, U., Lee, S., Fullerton, V., Yusuf, Y., Krantz, S., & Henstridge, M. (2018). *Indonesia case study: Rapid technological change—Challenges and opportunities*. Pathways for Prosperity Commission Background Paper Series.
- Suarsa, S. H., Judijanto, L., & Kushariyadi, K. (2025). *Pemasaran digital: Teori dan praktik pemasaran digital UMKM di Indonesia*. PT Sonpedia Publishing Indonesia.

© 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY SA) license (<https://creativecommons.org/licenses/by-sa/4.0/>).

