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Aligning Digital Development Strategic For Sustainable Economic: Systematic Literature Approach

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Abstrak

Penelitian ini mengeksplorasi strategi pengembangan ekonomi digital untuk mendukung stabilitas lingkungan dan ekonomi jangka panjang di Indonesia. Dengan menggunakan metode tinjauan pustaka, studi ini menganalisis adopsi teknologi digital, kebijakan pemerintah, dan kolaborasi sektor publik-swasta dalam integrasi teknologi hijau. Hasil menunjukkan bahwa digitalisasi telah mengurangi penggunaan bahan baku dan energi fosil serta mendorong inovasi teknologi hijau. Namun, tantangan seperti kesenjangan digital dan keterbatasan infrastruktur masih tetap ada. Strategi yang efektif meliputi peningkatan infrastruktur, insentif keuangan, pendidikan yang relevan, penyederhanaan regulasi, dan kampanye kesadaran. Kolaborasi antara pemerintah, sektor swasta, dan masyarakat sangat penting untuk memaksimalkan manfaat teknologi digital dan hijau, mendukung pertumbuhan ekonomi berkelanjutan dan stabilitas lingkungan jangka panjang di Indonesia.

Kata Kunci: *Ekonomi Digital; Teknologi Canggih; Keberlanjutan;Kolaborasi Publik-Swasta; Digitalisasi*

Abstract

This research explores digital economy development strategies to support long-term environmental and economic stability in Indonesia. Using a literature review method, this study analyzes digital technology adoption, government policies, and public-private sector collaboration in green technology integration. Results show that digitalization has reduced the use of raw materials and fossil energy and encouraged green technology innovation. However, challenges such as the digital divide and infrastructure limitations remain. Effective strategies include infrastructure upgrades, financial incentives, relevant education, regulatory simplification, and awareness campaigns. Collaboration between the government, private sector and society is essential to maximize the benefits of digital and green technologies, supporting sustainable economic growth and long-term environmental stability in Indonesia

Keywords: *Digital Economy; Grend Technology; Sustainability;Public Private Collaboration Digitalization.*

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INTRODUCTION

The digital era has changed various aspects of human life, including the economic and environmental sectors. This has led to changes in people's habits that are influenced by advances in digital technology, bringing about major changes in social life (Prasetyo, 2019). One of the factors that caused this massive change to occur was the Covid-19 pandemic that occurred in 2020 (Siahaan, 2020), this progress not only brought efficiency and innovation in the social scope of society, but the business world was also affected by it. Environmental potential and challenges are becoming increasingly urgent in the midst of rapid progress (Fajriyani et al., 2023). According to research by (Y. Liu et al., 2022) shows that the adaptation of digital technology, one of which is the digital economy, can increase the productivity of green industries which can significantly improve economic sustainability.

The digital economy, which includes the use of information and communication technology (ICT) as a support for economic activity, has become a major driver of economic growth in many countries, including in Indonesia. The implications of digital technology can open up new opportunities for various business sectors and create many new jobs. Challenges and risks arise along with the development of digitalization including in the economic sector, the main challenge faced is environmental sustainability amid the development of digitalization (Helmi et al., 2023).

Green technology, which includes environmentally friendly technological innovations and efficiency in the use of resources, is the key to reducing negative impacts on the environment. In the current era of globalization, the use of energy, especially fossil energy, has damaged the environment and nature around including spreading many pollutants that have a negative impact on environmental sustainability in the future (Maharani & Aryanta, 2023). (Z. Liu et al., 2021) found that the integration of green technology in the digital economy can help reduce carbon emissions and promote the use of renewable energy. Renewable energy is one of the solutions for efficient environmental sustainability (Dincer & Acar, 2015). The use of new renewable energy according to the Ministry of Energy and Mineral Resources reduces greenhouse gas (GHG) emissions in 2021 to 69.5 million tons of CO2e, or 104% of the target of 67 million tons of CO2e. In 2021 the renewable energy mix has reached 11.5% and targets the renewable energy mix to reach 23% by 2025 (Afandi, 2022). Positive changes that bring good should always have obstacles that often cause problems, one of which is explained in research by (Santy & Alam, 2022) which shows that the adoption of green technology is still hampered by high initial costs and lack of government incentives. Cost is the main factor that hinders the progress of green technology in each region, this is a challenge in the future for creators and producers to reduce the initial cost of implementing green technology.

Indonesia is a member of the G20 or Group of Twenty, which is an international economic cooperation forum comprised of countries with large economies in the world. As much as 60% of the earth's population, or 75% of global trade and 80% of world GDP are held by the G20. The G20 has an important role to play in the development of green technologies, and its large control capacity has great potential

to change the use of dirty energy that causes large carbon emissions to the use of green energy that is more environmentally friendly and creates sustainability. The Indonesian government has established various policies to support digital transformation and environmental sustainability, one example is the government's policy supporting technology startups that has increased the adoption of more integrated technologies to ensure that the digital economy also contributes to long-term environmental and economic stability.

While there have been many attempts by researchers to examine the impact of the digital economy and green technology separately, there is a lack of studies that combine these two aspects in the context of sustainable national development, particularly in Indonesia. Most studies still focus on technology implementation without considering its holistic impact on the economy and environment. This research will explore strategies for developing a digital economy integrated with green technology to support long-term environmental and economic stability in Indonesia. By analyzing variables such as digital technology adoption, government policies, collaboration between public and private sectors, and economic and environmental sustainability stability. This research is expected to provide new insights that are more comprehensive and applicable to policy makers and industry players.

LITERATURE RIVIEW

This research identifies gaps in the adoption of digital economy development strategies integrated with green technologies to support long-term economic and environmental stability in Indonesia. Literature shows that digitalization has a significant impact on reducing the use of fossil raw materials and energy and facilitating green technology innovation. Liu et al (2022) found that the implementation of the digital economy effectively increases productivity in the green industry sector, which significantly supports economic sustainability. However, infrastructure challenges and the digital divide are major obstacles to the implementation of this strategy, especially in regions where infrastructure is still limited.

In addition, the role of government policy in integrating digital and green technologies in Indonesia has been proven through various initiatives aimed at accelerating digital transformation in various sectors of the economy. Chen et al (2023) mentioned that smart city policies and SME digitalization play a major role in driving operational efficiency and reducing environmental impacts. However, research by Santy and Alam (2022) shows that the adoption of green technology is still hampered by high initial costs and lack of government incentives. With policies that encourage collaboration between the public and private sectors, the adoption of green technologies in the digital economy can be optimally accelerated (Kadin Indonesia, 2024).

Various studies have underscored the importance of infrastructure development and provision of incentives to overcome the digital divide and increase access to green technologies. Wahyuni et al. (2023) emphasized the importance of investment in renewable energy and the development of smart electricity grids, which support

energy distribution efficiency and reduce carbon emissions. This suggests that while challenges remain, cross-sector collaboration has great potential to support environmental sustainability through green technology.

This literature review builds the foundation for the research question of how a holistic strategy in the digital economy and green technology can support sustainable development in Indonesia. This research seeks to address the need for a more integrated approach, involving various stakeholders, and supported by proactive policies to achieve long-term economic and environmental stability.

METHODOLOGY

This study uses the *Literature Review* method to explore digital economy development strategies that support long-term environmental and economic stability in Indonesia. (Ridwan et al., 2021) stated that *Literature Review* is a summary obtained from a number of reading sources relevant to the research topic. *Literature Review* serves as the basis for data collection preparation.

The data used in this study was collected through a review of various literature. The data was obtained from several journals found in Google Scholar, Scopus and Semantic Scholar. The keywords used to search the journal are "Digital Economy, Environmental Sustainability of Digital Innovation, Green Technology, National Development". The selection of journal search results is carried out by selecting based on predetermined criteria Maulida (2020).

Data Analysis Techniques

According to Dang & Pekkola (2017) Data analysis is the process of systematically collecting and compiling information obtained from various other sources, so that it is easy to understand and the results can be conveyed to others. Information from each source is then compared and combined to produce a comprehensive understanding. This research fully uses secondary data obtained from relevant and reliable.

RESULTS AND DISCUSSION

Digitalization in Indonesia

Digitalization in Indonesia began to penetrate widely in the era of industry 4.0, with its peak in 2020 when the Covid-19 pandemic hit the world, government policies that forced *lockdowns* in all provinces accelerated the use of technology and digitalization in Indonesia. Many industry sectors changed the governance and management of their companies in the midst of the pandemic. One of the implementations in digitalization is the implementation of work *from home*, which aims to reduce the spread of Cobid-19 (Apt, 2021). Digital technologies are not only applied in the industrial sector, but also in the education and banking sectors, playing an important role (Sardana & Singhania, 2018). The use of cashless transactions has brought about a new habit that has persisted to this day, and the use of technology as a learning medium provides other benefits for the environment (Az-Zahra et al., 2023).

Digitalization in various sectors has both positive and negative impacts. According to research, digitalization has reduced the use of the main raw material for

making paper, namely trees. This reduction is increasing every year, as more and more documents are sent and used digitally (Adha, 2022). Innovations such as digital stamps developed by the finance ministry take advantage of technological advances to reduce the use of paper (Setyawati, 2022). Financial digitalization is also increasingly widespread with the use of QRIS by the public and business actors, including MSMEs and street vendors (Wulandari et al., 2021). QRIS is a payment instrument that can be accessed through various mobile banking applications and e-wallets registered with Bank Indonesia and supervised by the OJK.

The reduction of raw materials in papermaking brings various domino effects in the industry, including the reduction in the use of environmentally damaging fossil energy in the paper production process. The reduction of energy and natural resources exploited in paper production has a positive impact on the environment, reducing emissions emitted. These changes also encourage humans to overcome the threat of worsening climate change. The increase in the earth's temperature, which had touched 1°C, illustrates the poor global climate conditions. Reducing the use of fossil energy caused by digitalization is a good first step, but it is not enough to solve the problem of complex climate change. Therefore, there is an urgent need to adopt more environmentally friendly technologies and introduce green energy.

1. Adoption of Renewable Energy and Eco-Friendly Technology Innovation

Reducing the use of fossil energy is driving investment in renewable energy such as solar, wind, and biomass. This green energy not only reduces carbon emissions but also reduces dependence on limited natural resources. According to (Priajana et al., 2020), The increase in renewable energy capacity in Indonesia has shown positive results, with several solar and wind energy projects already operating efficiently. In addition, the development of digital technology also encourages innovation in other environmentally friendly technologies. For example, the use of IoT (*Internet of Things*) in energy management allows for more efficient energy monitoring and management in various sectors.

One of the real implementations of public-private sector collaboration in digitalization is the increase in the use of electric vehicles. Supportive government policies and investments from automotive companies have accelerated the adoption of electric vehicles in Indonesia. Wibowo (2023), reported that with tax incentives and adequate charging infrastructure, the number of electric vehicles in Indonesia has increased significantly, reducing air pollution in cities.

The construction of a smart *grid* supported by digital technology also plays an important role in optimizing energy use. Khalid (2024) demonstrating that *smart grids* enable better integration of renewable energy sources and improve energy distribution efficiency. It reduces energy loss and ensures a stable and environmentally friendly energy supply. Digital technology is also used in more efficient waste management.

IoT-based waste management systems enable *real-time* monitoring and management of waste, reducing unnecessary waste disposal and increasing recycling rates.

2. *The Domino Effect of Digitalization*

Digitalization has a significant domino effect on the reduction of energy and raw material use. With the increasing adoption of digital and green technologies, Indonesia can achieve its targets and continue to increase carbon emission reductions every year.

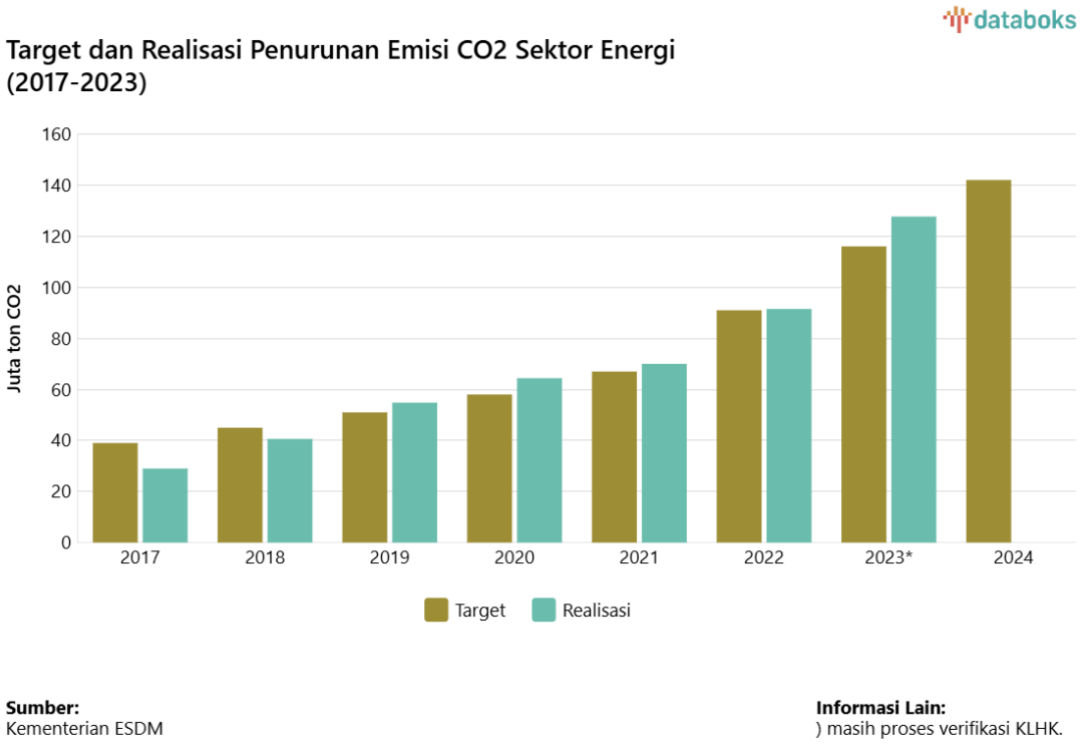


Figure 1. Targets and realization of CO2 emission reduction in the Energy Sector

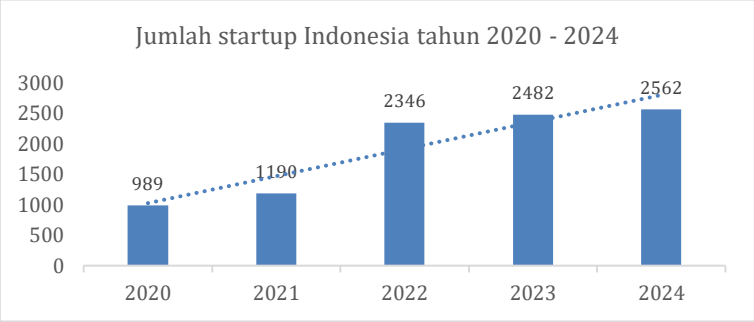
Targets and realization of CO2 emission reduction in the energy sector in Indonesia from 2017 to 2024. The trend seen shows a consistent increase in both targets and realization from year to year. In 2017, the realization (29) was below the target (39), but since 2019, the realization has consistently exceeded the target. The biggest difference between the target and the realization occurred in 2023, with the target of 116 and the realization of 127.67 (marked with an asterisk, possibly indicating provisional data). The target for 2024 is set at 142, while realization is not yet available. This data indicates the challenges in achieving the CO2 emission reduction target, with realizations tending to be higher than planned, indicating the need for more effective mitigation strategies in Indonesia's energy sector. A significant increase in carbon emission reduction can improve the quality of the environment. In addition, the adoption of this technology is driving further innovation in cleaner and more efficient energy solutions. The reduction in the use of fossil energy caused by digitalization also

encourages humans to continue to innovate towards increasingly environmentally friendly technology. The use of green energy such as solar, wind, and biomass is becoming more prevalent and recognized as a healthier and better alternative to fossil energy. According to (B. Chen et al., 2019), The transition to renewable energy not only reduces environmental impact but also opens new economic opportunities, creating jobs in new, sustainable sectors. Overall, digitalization has brought a significant positive impact on the environment in Indonesia. Through reducing the use of raw materials and fossil energy, as well as increasing the adoption of green technologies and renewable energy, Indonesia can address some of the biggest environmental challenges facing today. Collaboration between the public and private sectors in supporting the adoption of these technologies is essential to achieve sustainable development goals and ensure a greener and healthier future for future generations.

3. *The Adoption of Digital Technology Can Affect Economic Stability in Indonesia in the Long Term*

The adoption of digital technology in Indonesia has shown a significant influence on various economic sectors. The growth of the digital economy can be seen from the rapid increase in e-commerce, fintech, and digital stratup in recent years. Based on data from databooks, the increase in the number of startups in Indonesia has soared from 2020 to 2024.

Figure 2. Number of startups in Indonesia



This graph shows the growth in the number of startups in Indonesia from 2020 to 2024. Starting from 989 startups in 2020, the number is increasing consistently every year. The most significant growth occurred between 2021 and 2022, with an increase of 97.14%. The following years showed more moderate growth, with 5.80% in 2023 and a projection of 3.22% for 2024. Although the pace of growth slowed after a major surge in 2022, the overall trend remains positive, reflecting steady developments in Indonesia's startup ecosystem. This makes Indonesia the country with the largest number of startups number 1 in ASEAN and number 6 at the global level in 2024 (Databooks, 2024). The rise of startups shows one of the driving factors for digitalization in Indonesia, namely, the increase in the number of new industries that are on average engaged in the technology sector.

Based on research by Nguimkeu & Okou (2021) The adoption of digital technology can increase productivity by reducing operational costs and improving the efficiency of business processes. This is especially evident in the financial services sector, where fintech has enabled access to broader and more inclusive financial services (Ediagbonya & Tioluwani, 2023). Increasing productivity through digitalization can also support long-term economic stability by creating new jobs and expanding markets. According to (Javaid et al., 2022), The implementation of digital technology in the manufacturing sector has improved the company's ability to compete in the global market through improved production quality and efficiency. In addition, digital technology also enables product and service innovation, which in turn can drive sustainable economic growth. In addition to productivity, digital technology is also fighting a war in strengthening the informal sector, which accounts for most of the workforce in Indonesia. Study by M. A. Chen (2016) Pointing out that digital platforms such as *marketplaces* and social media have opened up new opportunities for informal workers to earn additional income and access to a wider market, this helps reduce unemployment and improve people's welfare, which is a pentin aspect of economic stability.

The adoption of digital technology also presents its own challenges. One of the main challenges is the digital *divide* between urban and rural areas. Research by Bangsawan (2023) revealed that access to digital technology is still limited in many rural areas in Indonesia, which can hinder equitable economic growth. Therefore, there needs to be policies that support the development of digital infrastructure throughout Indonesia to ensure that the benefits of digital technology can be felt by all levels of society. In terms of policy, the Indonesian government has implemented various initiatives to support the adoption of digital technology. Djanggih (2022) noted that programs such as "100 *Smart Cities*" and the development of equitable internet infrastructure along with high-speed internet contribute significantly to accelerating digital transformation in various sectors.

Collaboration between the public and private sectors also plays an important role in accelerating the adoption of digital technologies. Trenggono & Bachtiar (2023) Pointing out that some companies and individuals are still reluctant to adopt digital technologies due to a lack of understanding and skills, education and training are the main focuses that need to be considered to create sustainability. It is important to ensure that all parties are ready to adapt to the changes brought about by digitalization. The adoption of digital technology can also carry cybersecurity risks. On June 6, 2024, there was an attack on Indonesia's National Data Center (PDN) which resulted in significant disruptions to many public facilities and services. This hampers the activities of all Indonesian citizens, thus hindering economic stability. It is important to develop a cybersecurity policy and continuously improve security and awareness about security practices among technology users.

The adoption of technology in Indonesia is phased in to support economic stability by creating an ecosystem that is more efficient, inclusive, and innovative. Research by (Hastiadi et al., 2023) shows that digitalization can drive more sustainable economic growth by facilitating more efficient use of resources and reducing environmental impact. However, to achieve long-term economic stability. There needs to be a holistic and integrated strategy. Governments, the private sector, and society must work together to address the challenges faced and maximize the benefits of digital technology. These include equitable infrastructure development, digitalm upskilling and the implementation of policies that support innovation and inclusivity.

Indonesian government policies that have been implemented to support the integration of digital technology and green technology

The Indonesian government has launched various policies to support the integration of digital and green technologies. One of the key policies is the National Artificial Intelligence (AI) Strategy 2020-2045 which aims to encourage the adoption of AI in various sectors, including more efficient and environmentally friendly management of natural resources (L. Chen et al., 2023). In addition, Presidential Regulation No. 39 of 2019 concerning One Data Indonesia aims to improve the quality of data and information used in decision-making, so that the implementation of green and digital technologies can be carried out more effectively by reducing duplication and inefficiency (Azizah Saffa, 2024)

The master plan for the acceleration and expansion of Indonesia's economic development (MP3EI) 2020-2025. MP3EI includes initiatives to integrate digital technologies in the development of green infrastructure, such as the construction of smart grids and renewable energy facilities integrated with digital technologies to improve efficiency and sustainability (L. Chen et al., 2023). In addition, the government provides tax incentives and subsidies for renewable energy projects, including solar, wind, and biomass, to reduce dependence on fossil energy and encourage the use of green energy (L. Chen et al., 2023) .

The effectiveness of government policies can be seen from the increase in renewable energy capacity in Indonesia, which has increased significantly. Several solar and wind energy projects are already operating efficiently, although there are still challenges in terms of funding and infrastructure (Nasution, 2022). The implementation of green policies has also had a positive impact on reducing carbon emissions. For example, the construction of *smart grids* has reduced energy loss and improved energy distribution efficiency (Azizah Saffa, 2024).

Collaboration between Indonesia and other countries, such as the United Kingdom, has accelerated the transfer of technology and knowledge. Programs such as Digital Hub: UK-Indonesia Tech Hub x MARKAS have helped in developing digital

talent and encouraging innovation in green technology (Instellar, 2024). In addition, smart city development programs in various cities in Indonesia, such as Jakarta and Surabaya, have integrated digital and green technologies to improve the quality of life of residents and reduce environmental impact. These initiatives include IoT-based waste management and eco-friendly transportation.

The effectiveness of the policy in improving data quality can be seen from the success of Satu Data Indonesia in improving the quality of data used in environmental decision-making. With more accurate data, governments can more effectively identify areas that need green and digital interventions. However, the main challenge is in terms of implementation and integration of data from different sectors. Although tax incentives and subsidies have encouraged investment in renewable energy, challenges in funding and infrastructure remain. Many green energy projects are delayed due to a lack of adequate funding and infrastructure support (Purwantiasning et al., 2015).

Collaboration between the public and private sectors has shown positive results in the development of green technologies. Programs like Digital Hub have boosted digital skills and encouraged innovation. However, further efforts are still needed to ensure the sustainability of these projects and ensure that the benefits are felt by all levels of society. Government policies have contributed to improving the quality of the environment, with reduced carbon emissions and improved energy efficiency. However, to achieve long-term goals, continuous monitoring and evaluation are needed to ensure that these policies continue to be effective and relevant to technological developments.

Collaboration between the public and private sectors in accelerating the adoption of green technology in the digital economy in Indonesia

Collaboration between the public and private sectors has great potential to accelerate the adoption of green technologies in the digital economy in Indonesia. The Indonesian government has initiated several policies and initiatives that encourage this collaboration, which can be seen from some of the strategic steps that have been taken. Recent data and analysis show the various benefits and challenges faced in the implementation of this policy. The McKinsey Platform for Climate Technology Indonesia (MPCT) is one of the initiatives launched by McKinsey to help clients develop sustainable technologies that can transform carbon-intensive products, systems, and services. MPCT focuses on six green technology sectors that have the greatest transformational impact, including mobility and battery value chains, hydrogen and carbon capture, energy transition and renewable energy, nature-based solutions and biofuels, carbon markets, and green financing. This initiative aims to support the decarbonization of the private sector and encourage the growth of green businesses in Indonesia (Agarwal et al., 2024).

The Indonesian Chamber of Commerce and Industry (KADIN) also plays a significant role in the digitization of SMEs through the "Wiki Entrepreneurship" platform, which is designed to assist SMEs in addressing supply chain issues and connecting them with government programs related to empowerment. KADIN hopes that this platform can be a model for other developing countries facing similar problems, and encourage collaboration between the public and private sectors to overcome the digital divide (Kadin Indonesia, 2024). In addition, Indonesia is committed to achieving net-zero emissions by 2060 or sooner, with clear decarbonization targets (Zahira & Fadillah, 2022). Public-private sector collaboration in achieving this target includes 100% electric vehicle adoption by 2050, ensuring 70% of the power generation mix comes from renewable energy, and 30% coverage of emissions from industrial activities by carbon capture, utilization, and storage (CCUS) (Wahyuni et al., 2023)

This collaboration accelerates innovation and adoption of green technologies. Initiatives such as MPCT Indonesia demonstrate that strong partnerships can lead to sustainable and transformational technology solutions. However, this success relies heavily on consistent policy support and active engagement from all stakeholders. The digitalization of SMEs, as encouraged by KADIN, not only increases productivity but also strengthens financial inclusion. By providing easier access to digital tools, SMEs can increase their competitiveness. In addition, digitalization also supports gender equality by providing access to trustworthy credit for unbanked SMEs, many of which are owned and managed by women.

Despite the many advantages, there are significant challenges such as the digital divide between urban and rural areas and limited funds and infrastructure. To address this, further efforts are needed in improving digital skills and providing equitable access to technology. In addition, international collaboration can play an important role in the transfer of technology and knowledge, as seen in cooperation programs between Indonesia and other countries. Thus, public-private sector collaboration in Indonesia shows great potential in accelerating the adoption of green technology in the digital economy. However, to achieve optimal results, a comprehensive and sustainable approach that involves all stakeholders is needed.

Barriers and Opportunities in Integrating Digital and Green Technologies in Indonesia and Effective Development Strategies

One of the main obstacles in the integration of digital and green technologies in Indonesia is the lack of adequate infrastructure. In many areas, especially in rural areas, access to a stable and fast internet network is still a significant problem. In addition, renewable energy infrastructure such as solar panels and wind turbines is not evenly distributed throughout Indonesia. This lack of infrastructure is a major obstacle to the adoption of green and digital technologies (Rupeika-Apoga &

Petrovska, 2022). Limited funds are also a big obstacle. The initial cost of adopting green and digital technologies is often high. Many small and medium-sized enterprises (SMEs) face difficulties in accessing the funding needed to carry out this transformation. The lack of financial incentives from the government also exacerbates this condition, making many SMEs unable to switch to more environmentally friendly technologies.

Digital and green transformation also requires a workforce with special skills, which is currently still limited in Indonesia. The limited number of experts who master digital and green technology is a major obstacle. Relevant education and training are still not widely available, resulting in a lack of skilled human resources in this field (Perdana et al., 2023). Existing regulations often do not support or even hinder the adoption of green and digital technologies. Complicated licensing processes and slow bureaucracy are often a barrier for companies looking to innovate. These unsupportive regulations add to the burden on companies looking to adopt green and digital technologies (Diana, 2024). Many business actors also do not fully understand the benefits of green and digital technology. Awareness of the importance of sustainability and energy efficiency is still low, which has led to low adoption of this technology. This lack of awareness and knowledge is one of the main factors hindering the integration of green and digital technology in Indonesia (Lubis & Junaidi, 2016).

There is a great opportunity in the integration of digital and green technologies in Indonesia. The Government of Indonesia has shown its commitment to supporting green and digital transformation through various policies and initiatives. For example, Indonesia is committed to achieving net-zero emissions by 2060, which presents great opportunities for the development of green technologies. Indonesia also has a large market potential for green and digital technology, given its large population and growing digital economy sector. This potential can be used to encourage wider adoption of technology, providing opportunities for companies to innovate and develop more environmentally friendly technology solutions (Buana et al., 2024). Cooperation with other countries and international organizations can also help with the transfer of technology and knowledge. Initiatives like McKinsey's *Climate Technology* Platform show how international collaboration can drive innovation and adoption of green technologies. This international partnership provides an opportunity for Indonesia to adopt the latest and best technologies in an effort to achieve sustainability.

Local innovations also have great potential to be developed and adopted more widely. For example, the development of locally based renewable energy such as microhydro and solar power in rural areas can be an effective and sustainable solution. These innovations provide opportunities for the development of green technologies that suit local needs and conditions. Increasing awareness and education about the benefits of green and digital technologies can also be an important step to encourage

adoption. Awareness campaigns and training programs can help accelerate this transformation. By increasing understanding the importance of sustainability, the public and business actors will be more open to adopting green and digital technologies. To overcome obstacles and take advantage of existing opportunities, an effective development strategy is needed.

The government needs to improve technology and renewable energy infrastructure throughout Indonesia. Ensuring fast and stable internet access and expanding renewable energy networks are important first steps. Second, governments and the private sector should provide more financial incentives for companies that adopt green and digital technologies. This can be in the form of subsidies, soft credits, or tax incentives, which can help reduce the initial cost burden for the company. This financial support will encourage more companies to switch to green and digital technologies. Third, provide relevant education and training to improve workforce skills in the field of green and digital technology. An easily accessible and widely available training program will help address the shortage of skilled labor and accelerate green and digital transformation. Fourth, simplifying the licensing and regulatory process that supports technological innovation. The government needs to reduce bureaucracy and speed up the licensing process for the adoption of new technologies. More supportive regulations will make it easier for companies to innovate and adopt green and digital technologies. Finally, hold an awareness campaign to increase understanding of the benefits of green and digital technologies. This can be done through mass media, seminars, and workshops involving various stakeholders. This awareness campaign will help raise public awareness and business actors about the importance of sustainability and energy efficiency, encouraging the adoption of green and digital technologies.

The research underscores that the integration of the digital economy with green technologies plays an important role in supporting environmental sustainability and long-term economic stability. Digitalization is proven to not only improve the efficiency of operational processes but also positively impact the use of natural resources and fossil energy, contributing to the reduction of carbon emissions. These findings emphasize that the adoption of digital technologies, particularly in the industrial and energy sectors, can support environmental sustainability goals while strengthening the economy by creating new environmentally friendly opportunities.

Challenges such as the digital divide and infrastructure limitations remain a major obstacle, especially in regions that are less accessible to technology. This highlights the importance of the government's role in providing support, both in the form of policies and infrastructure development, to ensure the benefits of digitalization can be felt equally. In addition, collaboration between the public and private sectors is key to creating an ecosystem that supports green technology innovation. With effective policy support and collaboration, Indonesia can harness the potential of the digital economy and green technology to achieve sustainable development in the future.

CONCLUSION

This research shows that the development of the digital economy has significant potential to support long-term environmental and economic stability in Indonesia. The adoption of digital technologies has had a positive impact in reducing the use of fossil raw materials and energy, as well as encouraging innovation in environmentally friendly technologies. However, challenges such as the digital divide, limited infrastructure, and lack of digital skills are still obstacles that need to be overcome.
The Indonesian government's policies in supporting the integration of digital and green technologies have shown positive results, especially in terms of increasing renewable energy capacity and reducing carbon emissions. Collaboration between the public and private sectors has also played an important role in accelerating the adoption of green technologies in the digital economy, as seen in the climate technology platform initiative and the digitization of SMEs.

To optimize the potential of the digital economy in supporting environmental and economic stability, a comprehensive development strategy is needed. This includes upgrading technology infrastructure and renewable energy, providing financial incentives, developing relevant education and training programs, simplifying regulations, and raising public awareness about the benefits of green and digital technologies. The integration of digital and green technologies through close collaboration between the government, private sector and society is key to achieving sustainable economic growth and long-term environmental stability in Indonesia. By addressing existing challenges and effectively capitalizing on opportunities, Indonesia can position itself as a leader in an environmentally friendly digital economy in the Southeast Asian region and globally.

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