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Digital Transformation and Sustainable Economic Development

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ABSTRACT

Digital transformation has become an important factor in modern economic development in the era of Industrial Revolution 4.0. This study aims to analyze the role of digital transformation in supporting sustainable economic development using a Systematic Literature Review (SLR) approach. Research data were obtained from various scientific articles indexed by Google Scholar published over the last five years. The analysis process was carried out through the identification, selection, evaluation, and synthesis of literature related to digital transformation, digital economy, and sustainability economy. The results show that digital transformation has a significant contribution to improving economic efficiency, productivity, innovation, and competitiveness through the utilization of digital technology. In addition, digitalization also supports sustainable economic development through optimizing resource utilization, reducing operational costs, and improving the quality of economic services. However, the implementation of digital transformation still faces challenges such as limited digital infrastructure, low technological literacy, and unequal digital access. Therefore, policy support and technology capacity development are needed to strengthen sustainability economy in the modern economic era.

Keywords: *Digital Economy, Digital Transformation, Economic Development, Sustainability, Technology.*

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1. | INTRODUCTION

Digital transformation has become one of the key drivers of change in the global economic system during the era of the Fourth Industrial Revolution. Advances in digital technology have influenced various economic activities through the use of the internet, big data, artificial intelligence, digital platforms, and rapidly evolving electronic transaction systems. Digitalization not only creates economic efficiency but also drives changes in production, distribution, consumption, and business models toward more modern and integrated approaches. These changes mean that economic development is no longer focused solely on growth but also on economic, social, and environmental sustainability (Guandalini, 2022).

The growth of the digital economy has accelerated over the past five years, in tandem with the increasing use of information technology across various economic sectors. The adoption of digital technology is seen as capable of enhancing productivity, operational efficiency, and expanding market access through more flexible and innovative digital systems. Furthermore, digital transformation has become a key strategy in fostering sustainable economic development, as technology can help optimize resource utilization and enhance economic competitiveness more effectively (Pan et al., 2022).

In the context of sustainable development, digital transformation is viewed as a vital instrument for supporting a sustainability economy through the integration of digital technology and innovation into modern economic activities. The utilization of digital technology can create energy efficiency, reduce operational costs, improve service quality, and strengthen a knowledge- and innovation-based economic system. Therefore, the development of the digital economy not only impacts economic growth but also the sustainability of long-term development (Feroz et al., 2021).

Several previous studies have examined the relationship between digital technology and sustainable development. The research by Adamowicz and Zwolińska-Ligaj (2020) explains that the concepts of smart systems and digitalization can support sustainable development through the integration of technology and more efficient resource management. Other research indicates that digital transformation can serve as a key strategy for achieving sustainability through enhanced innovation and modern economic efficiency (Gomez-Trujillo & Gonzalez-Perez, 2021). Additionally, Pauliuk et al. (2022) explain that modern economic development requires collaboration between digital transformation and sustainable development to create an economic system adaptable to global developments.

Nevertheless, most previous research has primarily focused on specific sectors such as smart villages, digital tourism, SMEs, and technology-based regional development. Prior studies also tend to adopt local and regional approaches, resulting in limited research that comprehensively addresses digital transformation within the broader context of general economic development. Furthermore, most studies emphasize

technology implementation over analyzing the broader impacts of digitalization on sustainable economic development (Jaelani & Hanim, 2021).

The rapid development of the digital economy over the past five years demonstrates that digital transformation has become a primary necessity in modern economic development. Digitalization drives structural changes in the economy toward a system based on innovation, connectivity, and technological efficiency. These conditions necessitate a more in-depth examination of how digital transformation can support sustainable economic development through the integration of technology, innovation, and the sustainability economy (Melnyk et al., 2019).

Based on this description, this study aims to analyze the role of digital transformation in supporting sustainable economic development in the modern economic era. This study is expected to provide a theoretical contribution regarding the relationship between digitalization and the sustainability economy and to serve as a reference in the development of digital technology-based economic policies.

2. | LITERATURE REVIEW

Digital Transformation in Economic Development

Digital transformation is the process of changing the economic system through the use of digital technology in various economic production, distribution, and service activities. Advances in information technology have brought about significant changes to modern economic patterns through the use of the internet, artificial intelligence, big data, cloud computing, and digital platforms that can improve operational efficiency and economic productivity. Digital transformation also drives the emergence of new, more innovative, and competitive business models, thereby enhancing economic competitiveness in the era of globalization (Guandalini, 2022).

The shift toward a digital-based economic system demonstrates that technology is a critical factor in supporting modern economic growth. The use of digital technology enables economic processes to operate more quickly, flexibly, and efficiently through the integration of data and real-time connected digital systems. Additionally, digitalization facilitates economic decision-making, as the use of technology enhances the effectiveness of managing economic information and resources more optimally (Pan et al., 2022).

In its development, digital transformation is not only focused on technology adoption but also on comprehensive changes in economic development strategies. The application of digital technology can help create an economic system that is adaptive to global changes and the developments of the Fourth Industrial Revolution. Therefore, digital transformation has become a key strategy in modern economic development focused on innovation, efficiency, and long-term economic sustainability (Melnyk et al., 2019).

Sustainable Economic Development

Sustainable economic development is a development concept that emphasizes a balance between economic growth, social sustainability, and environmental conservation. This concept aims to create an economic system capable of meeting the needs of the current generation without compromising the ability of future generations to meet their own needs. In the modern economic era, sustainable development has become a critical issue due to growing global challenges such as environmental degradation, economic inequality, and rapid technological change (Feroz et al., 2021).

The use of digital technology is seen as capable of supporting sustainable economic development through improved resource efficiency and the optimization of technology-based economic activities. Digital technology enables economic processes to operate more effectively with lower operational costs and more efficient energy use. Additionally, digital systems can help foster economic innovations that are more environmentally friendly and aligned with a sustainability-oriented economy (Pauliuk et al., 2022).

The concept of sustainable economic development is also linked to the integration of technology, innovation, and efficient resource management. The use of digital technology in modern economic systems can improve service quality, expand economic access, and strengthen connectivity across economic sectors. Thus, sustainable economic development requires support for digital transformation to create a more adaptive, efficient, and sustainable economic system in today's digital economy (Adamowicz & Zwolińska-Ligaj, 2020).

3. | RESEARCH METHOD

This study employs the Systematic Literature Review (SLR) method to analyze various scientific studies on digital transformation and sustainable economic development. The SLR method was chosen because it provides a more systematic, structured, and comprehensive understanding of research developments related to economic digitalization, the sustainability economy, and the use of digital technology in modern economic development. Additionally, this method assists researchers in identifying research patterns, research gaps, and the evolution of concepts and theories relevant to the research topic.

The data collection process involved searching for scientific articles indexed in Google Scholar published within the last five years. This timeframe was selected to ensure the research's relevance to the current state of the digital economy. The keywords used in the literature search process include "digital transformation," "digital economy," "sustainable development," "sustainability economy," "technology and economic development," and "smart economy." The selected literature consists of scientific articles, national and international journals, and academic documents directly related to digital transformation and sustainable economic development.

The research process began with literature identification through a search for articles relevant to the research topic. This was followed by a screening process to select relevant articles based on their titles, abstracts, research objectives, and alignment with the study's focus. Articles deemed irrelevant, those discussing topics outside the research theme, or those not meeting the publication year range were excluded from the analysis. Following this, an eligibility assessment was conducted by reviewing the full text of the articles to ensure the research content aligns with the themes of digital transformation and sustainable economic development.

The collected data was then analyzed using qualitative descriptive methods through data reduction, thematic grouping, and interpretation of the literature's content. The analysis was conducted by identifying relationships between digital transformation, technological innovation, economic efficiency, and the sustainability economy based on previous research findings. Additionally, this study analyzed various findings related to the impact of digitalization on modern economic development as well as the challenges of implementing digital transformation in support of sustainable development.

Through the Systematic Literature Review method, this study is expected to produce a comprehensive literature synthesis regarding the role of digital transformation in sustainable economic development. This method also provides an overview of the development of previous research, research topic trends, and opportunities for further research related to the digital economy and the sustainability economy in the modern era.

4. | RESULTS

Digital transformation has become a vital component of modern economic development, as digital technology enables the creation of economic systems that are more efficient, innovative, and sustainability-oriented. Advances in information technology over the past five years have led to a significant increase in the use of digital systems in economic activities. Digitalization not only influences business models and economic transactions but also transforms economic structures toward technology- and innovation-based economic systems. These conditions indicate that digital transformation plays a strategic role in supporting sustainable economic development in the modern era (Guandalini, 2022).

The utilization of digital technology in the economic sector yields various positive impacts on enhancing operational efficiency and economic productivity. Digital systems enable production, distribution, and marketing processes to operate more efficiently and reduce operational costs through automation and digital data integration. Additionally, the use of digital technology helps economic actors expand market access through digital platforms and e-commerce, thereby making economic activities more flexible and competitive (Pan et al., 2022).

The development of the digital economy demonstrates that technology has become a key factor in supporting modern economic growth. The use of information technology enables the creation of an economic system that is more adaptive to global changes and the advancements of the Fourth Industrial Revolution. The integration of digital technology across various economic sectors also enhances service quality, transaction speed, and the effectiveness of economic resource management in a more optimal manner. Thus, digital transformation functions not only as a technological tool but also as a modern economic development strategy oriented toward efficiency and innovation (Melnyk et al., 2019).

In the context of sustainable development, digital transformation is considered capable of supporting a sustainability economy through the use of more efficient and environmentally friendly technologies. Digital technology enables the reduction of excessive resource use because various economic activities can be performed automatically and integrated through digital systems. Additionally, digitalization helps reduce operational costs, improve energy efficiency, and optimize the management of economic data, thereby supporting more sustainable long-term economic development (Feroz et al., 2021).

Research findings indicate that the implementation of digital transformation can enhance economic competitiveness by strengthening technology-based innovation and economic connectivity. Digital systems facilitate communication, transactions, and information distribution, making economic activities more effective and efficient. The use of digital technology also drives the creation of new, more modern economic innovations that are adaptable to societal needs in the digital era. These conditions indicate that digitalization makes a significant contribution to the development of an innovation-based economy and a sustainable economy (Pauliuk et al., 2022).

In addition to impacting economic efficiency, digital transformation also influences changes in business models and economic behavior among the public. The development of digital platforms, e-commerce, and internet-based services has led to a shift in economic transaction models from conventional systems toward more flexible digital systems. Digitalization enables economic activities to be conducted without the constraints of time and space, thereby enhancing the effectiveness of modern economic activities. These changes demonstrate that digital technology has become an integral part of the global economic system in the modern era (Gomez-Trujillo & Gonzalez-Perez, 2021).

The use of digital technology in economic development is also linked to the concept of the smart economy, which emphasizes the use of technology and innovation to manage economic resources more effectively. The concept of the smart economy aims to create an economic system capable of improving productivity, efficiency, and service quality through the integration of digital technology. The implementation of the smart economy also helps improve connectivity across economic sectors so that economic

activities can operate in a more integrated and sustainable manner (Adamowicz & Zwolińska-Ligaj, 2020).

The study's findings indicate that digital transformation offers significant opportunities to enhance public access to the economy through the use of digital platforms and information technology systems. Digitalization makes it easier for the public to access economic information, conduct digital transactions, and develop technology-based business activities. Additionally, the use of digital technology helps improve economic inclusion through broader and more efficient access to digital services, thereby supporting equitable economic development in the modern era (Gao et al., 2021).

Nevertheless, the implementation of digital transformation in economic development still faces various challenges. One of the main challenges is the limited digital infrastructure and the quality of human resources in operating digital technology optimally. The development of the digital economy requires adequate technological infrastructure support so that the digitization process can proceed effectively. Furthermore, low digital literacy also poses a barrier to the utilization of digital technology in various economic activities (Jaelani & Hanim, 2021).

Another challenge in digital transformation is the technological access gap among certain segments of society. Not all economic actors possess the same capabilities and access to digital technology, leading to disparities in the utilization of the digital economy. This situation can impact the effectiveness of digital-based economic development, as some segments of society still face limitations in accessing technology and digital information (Istanti, 2021).

In addition to infrastructure and technology access, digital transformation also requires changes in organizational culture and public mindset regarding the use of technology in economic activities. Digitalization is not merely about technology adoption but also involves changes in work systems, business models, and comprehensive economic management. Therefore, the success of digital transformation is heavily influenced by human resource readiness and the ability to adapt to digital technological changes in the modern era (Guandalini, 2022).

Research findings also indicate that sustainable economic development requires the integration of digital technology, economic innovation, and efficient resource management. Digital transformation can help create an economic system that is more adaptive to global changes through the use of technology that supports economic efficiency and environmental sustainability. Additionally, digitalization can enhance the effectiveness of economic data management and strengthen decision-making systems based on digital information (Feroz et al., 2021).

The development of digital technology in the modern economic era indicates that digitalization will continue to be a key factor in future economic development. Technology-based economic systems are considered capable of creating more innovative, competitive, and sustainable economic growth. Therefore, digital

transformation must be supported through the development of digital infrastructure, the improvement of technological literacy, and the strengthening of digital-based economic policies so that sustainable economic development can be optimally achieved (Pan et al., 2022).

5. | DISCUSSION

The results of this study indicate that digital transformation has a significant impact on sustainable economic development in the modern economic era. Digitalization not only plays a role in improving the efficiency of economic activities but also drives the creation of an economic system that is more innovative, flexible, and adaptable to global changes. The utilization of digital technology enables economic processes to operate more effectively through data integration, system automation, and the use of digital platforms capable of accelerating modern economic activities. These conditions demonstrate that digital transformation has become a key factor in supporting a sustainable economy in the era of the Fourth Industrial Revolution.

These research findings align with the study by Feroz et al. (2021), which explains that digital transformation can support sustainable development through efficient resource utilization, reduced operational costs, and the optimization of technology-based economic systems. Digital technology enables economic activities to be managed more effectively, thereby creating an economic system that is more environmentally friendly and oriented toward long-term sustainability. Additionally, digitalization helps improve the quality of economic services through the use of faster and more integrated digital systems.

This study also indicates that the development of the digital economy has shifted societal economic activities from conventional systems toward innovation-driven digital systems. This shift is evident in the increasing use of digital platforms, e-commerce, and internet-based services across various modern economic activities. These findings support the research by Pan et al. (2022), which states that the digital economy is a key factor in boosting productivity and economic competitiveness through the strengthening of technological innovation and digital-based economic connectivity.

On the other hand, digital transformation also faces various challenges in its implementation. Limitations in digital infrastructure, low technological literacy, and disparities in technology access are major obstacles to the development of a sustainable digital economy. These conditions indicate that the success of digital transformation is not solely determined by the availability of technology but also by the readiness of human resources and adequate policy support. This finding aligns with the research by Jaelani and Hanim (2021), which explains that the success of digitalization requires infrastructure support, the strengthening of human resource capacity, and the comprehensive integration of digital systems.

Furthermore, the concept of a smart economy in modern economic development is also a crucial component in supporting economic sustainability. The use of digital

technology in economic management enables the creation of a more efficient, transparent, and integrated economic system. Research by Adamowicz and Zwolińska-Ligaj (2020) explains that the integration of technology and digital innovation can enhance the effectiveness of economic resource management and strengthen sustainable development through the concept of smart systems.

Based on these research findings, it can be understood that digital transformation plays a strategic role in supporting sustainable economic development through improved economic efficiency, technological innovation, and strengthened digital economic connectivity. Therefore, modern economic development requires the integration of digital technology supported by infrastructure development, improved digital literacy, and economic policies capable of strengthening the sustainability economy in today's digital era.

6. | CONCLUSION

Digital transformation is a key factor in modern economic development because it enhances efficiency, productivity, and economic innovation through the use of digital technology. The growth of the digital economy in the era of the Fourth Industrial Revolution demonstrates that technology has become an integral part of various economic activities, ranging from production, distribution, and marketing to digital-based economic services. Digitalization also drives the formation of a more flexible, agile, and integrated economic system, thereby enhancing economic competitiveness in the era of globalization.

Research findings indicate that digital transformation makes a significant contribution to sustainable economic development through improved resource efficiency, strengthened economic connectivity, and the advancement of technology-driven innovation. The use of digital technology enables economic activities to be conducted more effectively and adaptively in response to global changes. Furthermore, digitalization supports a sustainable economy by reducing operational costs, optimizing data management, and improving the quality of modern economic services.

However, the implementation of digital transformation still faces various challenges, such as limited digital infrastructure, low technological literacy, and digital access disparities among certain segments of the population. Therefore, policy support, infrastructure development, and improvements in human resource quality are necessary to ensure digital transformation proceeds optimally. Thus, the integration of digital technology into economic development can serve as a key strategy in realizing an innovative, competitive, and sustainable economic system in the modern economic era.

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The authors declare that there is no conflict of interest.

Ethical Approval and Originality Statement

Ethical approval was obtained for this study. The manuscript represents original work and has not been previously published, nor is it under consideration by another journal.

Data Disclosure Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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