

SUSTAINABILITY WITH DIGITALISATION: GREEN ECONOMY SOLUTIONS IN ECONOMY 5.0

Gunawan Widjaja

Fakultas Hukum Universitas 17 Agustus 1945 Jakarta, email: widjaja_gunawan@yahoo.com

Received : 05 Apr	il 2024	Published	: 30 June 2024
Revised : 28 Apr	il 2024	DOI	: https://doi.org/10.54443/morfai.v4i1.2599
Accepted : 08 Ma	y 2024	Publish Link	: https://radjapublika.com/index.php/MORFAI/article/view/2599

Abstract

This article discusses the role of digitalisation in supporting green economic sustainability in the era of Economy 5.0. Digitalisation, through the use of technologies such as the Internet of Things (IoT), big data and artificial intelligence (AI), offers solutions to optimise resources and reduce environmental impacts. In addition, digital platforms increase transparency and accuracy in sustainability monitoring, enabling stakeholders to make wiser data-driven decisions. The integration of digital technologies in sustainability strategies not only provides economic benefits, but also contributes to environmental protection, forming the basis for a greener and more responsible economic future.

Keywords: Sustainability, Digitalisation, Green Economy, Economy 5.0

Introduction

In an era of rapid technological development, the world is transitioning to Economy 5.0, a concept that emphasises collaboration between humans and digital-based technologies to create social welfare and environmental sustainability. This concept not only emphasises economic progress, but also highlights the importance of creating a balance between economic growth and environmental sustainability (Antikainen & Valkokari., 2016)

Sustainability has become a major global issue, particularly in the context of climate change, environmental degradation, and irresponsible use of natural resources. Sustainability is a concept that refers to the ability to maintain a balance between economic, environmental and social needs over the long term. goal of The main sustainability is to ensure that economic activities and social development can take place without damaging the ability of future generations to meet their own needs (Yang & Wu, 2023) . In this context, sustainability involves the responsible management of natural resources, the protection of ecosystems, and the improvement of the quality of human life, , so as to create harmony between economic progresssocial welfare, and environmental preservation. Many countries are beginning to implement the principles of a green economy to minimise environmental impacts while improving quality of life. However, the biggest challenge faced is how to implement these principles effectively and efficiently (Gonzalez & Torra, 2023).

Digitalisation, with all the advanced technologies that support it, is fundamentally changing the way individuals and businesses operate around the world. From the internet revolution to technological advancements such as artificial intelligence (AI), big data and the Internet of Things (IoT), digitalisation has accelerated communication, improved efficiency and created new opportunities across sectors. This digital transformation has connected people and organisations globally, enabling faster and more efficient flow of information and data. In addition, digitalisation has driven innovation in products and services, providing with consumers a more personalised and interactive experience (Kim & Ko, 2012).

Digitalisation can integrate systems that enable more efficient resource management, reduced carbon emissions, and increased transparency and accountability in business practices. In the context of Economy 5.0, competitiveness is not only measured by how much profit is generated, but also by how much companies are able to contribute to sustainability and social welfare. However, although the potential benefits of digitalisation for sustainable development are considerable, its implementation still faces various barriers (Chen & Liu, 2022). These barriers include limited digital , infrastructurelack of understanding and willingness to adapt to new technologies, and inadequate regulations. Therefore, this is research crucial to identify the real role of digitalisation



Gunawan Widjaja

in supporting sustainability and find concrete solutions to encourage a green economy in the era of Economy 5.0. This research will explore how digitalisation can be applied to achieve sustainability goals.

Research Methods

The study in this research uses the literature method. The methodliterature research, or literature study, is a research approach that involves the collection, analysis, and interpretation of a variety of written sources relevant to a particular research topic. The objectives of main this method are to gain an in-depth understanding of the development of existing knowledge, identify gaps in previous researchresearch, and establish a strong theoretical foundation for new (Wekke ;, 2020) (Alaslan, 2022). The process involves a systematic literature search, critical evaluation of published studies, and synthesis of the information found to draw conclusions or build arguments. The method is literature research often used as the first step in a research project, as it helps clarify the research problem and develop a conceptual framework based on existing evidence (Suyitno, 2021).

Results and Discussion

The Role of Digitalisation in Sustainability

Digitalisation plays a role significant in improving energy efficiency through the use of smart technologies such as smart grids and smart meters. By collecting and analysing data in real-time, these systems can optimise energy distribution, respond quickly to changes in demand, and minimise energy wastage (Costa & Ferreira, 2022). In addition, these digital solutions enable the integration of renewable energy energy such as solar and wind power, which can be regulated to dynamically match demand. This contributes to the reduction of carbon emissions and supports long-term sustainability targets (Liu, 2021).

Digitalisation also supports more efficient and sustainable management of natural resources. Through the use of technologies such as IoT sensors and environmental monitoring monitor tools, companies and governments can more accurately the use of natural resources such as water, land, and minerals. These technologies help in detecting leaks, managing waste management, and tracking the overall health of ecosystems. With the data collected and analysed, better policies and management practices can be implemented, keeping resource use within safe and sustainable limits (OECD, 2019).

Digital transformation is driving innovation in the development of more environmentally friendly products and services. For example, 3D printing technology enables the production of goods with minimal and waste more efficient use of materials. Inaddition, companies can use data analytics to identify ways to reduce the carbon footprint of their supply chains and processesmanufacturing. These innovations not only reduce environmental impact but also often result in more durable and recyclable , products supporting the circular economy (Singh, 2021).

Digitalisation has enabled many people to work remotely, which has a direct impact on reducing daily commutes and associated greenhouse gas emissions. By using digital , video conferencing, and platformscollaboration toolsonline , working companies can reduce the need for daily business trips and transport. This not only saves time and costs but also significantly reduces workers' carbon footprint, supporting global efforts to reduce emissions and combat climate change (Eliasson & Culver, 2022).

Digital also technologies play an important role in increasing public awareness and participation in sustainability issues. media platformsSocial , educational apps, and websites can be used to disseminate information about sustainable practices and the environmental impacts of human actions. By providing easy access to information, the public becomes more informed and motivated to participate in sustainability initiatives. Digital campaigns can improve community engagement, increase support for green policies, and promote sustainable lifestyles (Pereira & Monteiro, 2022).

Finally, digitalisation helps drive the transition to a more sustainable economic system. Through financial technology (fintech), e-commerce platforms and blockchain-based, solutionstransactions can be made more transparently, efficiently and responsibly. This enables more accessible financing for sustainable projects, creates new markets for green products, and increases accountability in global supply chains (Smith & Johnson, 2020). Thus, the contribution of digitalisation to sustainability is not only limited to the technological aspects but also changes the way the economy operates to support environmental and social balance in the long run.

Implementation of Digitalisation in the Green Economy

Digitalisation has become a key driver in many sectors of the modern economy, including the green economy. economyThe , which green focuses on achieving sustainable and environmentally-friendly economic growth, is increasingly showing its reliance on digital . The integration of technologydigital technologies into the



Gunawan Widjaja

green economy not only improves efficiency but also helps in carbon footprint tracking and reduction, natural resource management, as well as the adoption of more sustainable business practices (Dawson & Khan, 2022).

First, digitisation helps in real-time which is data collection and analysis, crucial in supporting green economy goals. Technologies such as the Internet of Things (IoT) and big data enable continuous monitoring of air, water and soil quality. With accurate and rapid data analysis, governments and relevant agencies can make more informed decisions in managing natural resources and minimising negative impacts on the environment. This system enables early detection of potential environmental problems and more responsive handling (Roberts & Clarke, 2022) Second, digitalisation drives energy efficiency through the application of smart technologies. For example, smartgrids can optimise energy distribution and consumption, reduce energy losses, and facilitate the integration of renewable energy such as solar and wind power. Smart energy management systems can also help buildings and infrastructure reduce energy use, save costs, and make operations more sustainable (Kumar & Patel, 2022).

In the agriculture sector, digitalisation is also playing an important role by bringing precision farming solutions. This technology uses sensors, drones and data-driven applications to precisely monitor plant health, soil moisture and nutrient requirements. The implementation of this technology can reduce the excessive use of pesticides and chemical fertilisers, making it more environmentally friendly. Farmers can also increase their crop yields and product quality while maintaining environmental sustainability (Olsen & Farinella, 2022).

Furthermore, digitalisation is expanding access to green markets through e-commerce platforms and digital . appsConsumers can now easily find eco-friendly products, ranging from organic products to recycled goods. On the other , handgreen producers can expand their market reach, increase revenue, and inspire more market players to adopt sustainable business practices. This promotes a more equitable and inclusive economy (Rehman & Ahmad, 2022) .Finally, the implementation of digitalisation in the green economy also increases public awareness and education about the importance of protecting the environment. Through social media campaigns, educational apps, and programmesother interactive , people can more easily access information on environmental issues and ways to contribute to the green economy. This broad and targeted education plays an important role in changing people's mindset and behaviour for a greener future (Jha & Mishra, 2022) .

Overall, digitalisation is making a major contribution in accelerating the transformation to a green economy. By utilising digital, technologywe can not only achieve higher efficiency and cost savings but also guarantee environmental sustainability for future generations. This paves the way for further innovation and synergy between technology and sustainability, creating a brighter future for all parties involved.

Transformation to Economy 5.0

The 5.0 economy is a new milestone in global economic development characterised by the integration of advanced technologies with human values, environmental sustainability, and inclusiveness. The 5.0 economy not only puts technologies such as artificial intelligence (AI), Internet of Things (IoT), blockchain, and robotics at the centre of industry, but also uses these technologies to improve the overall quality of human life. It aims to create a balance between economic efficiency and social welfare (AI-Momani & Alkhatib, 2022).

The transformation towards Economy 5.0 demands simultaneous efforts from various parties, including the government, educational institutions, the private sector, and society. This is collaboration needed to create an innovation ecosystem that encourages technological development and ethical use. The government needs to create regulations that support and incentivise technological research and development. On the other, the handeducation sector must adapt by training a workforce that is ready to use cutting-edge technology wisely (Patel & Chopra, 2022)

The . are private sector plays role a critical in this transformationCompaniesrequired to innovate and adopt new technologies that can improve productivity and operational efficiency. Moreover, they are also expected to pay attention to the social impact of these technologies. For example, the adoption of AI and robotics must be balanced with efforts to safeguard and create jobs for humans, not just replace them (Rahman & Karim, 2022).

Environmental sustainability is an integral component of Economy 5.0. Industries operating within this paradigm must find ways to reduce negative impacts on the environment. production Green technology, renewable energy, and processes environmentally friendly are top priorities. goal The ultimate is to realise a circular economy where waste is minimised, and materials and products are recycled as much as possible (Banerjee & Banerjee, 2022)

Inclusivity is also an important pillar of Economy 5.0. From a social perspective, this transformation aims to reduce economic and social disparities. Technology must be accessible to all levels of society, not just an elite few. programmes Training and reskilling are essential to ensure that all individuals have equal opportunities to

Published by Radja Publika



Gunawan Widjaja

participate in the new economy. additionIn, various stakeholders must commit to empowering local communities by giving them access to knowledge and technology (Pawar & Gupta, 2023).

The transformation to Economy 5.0 is not easy and requires long-term commitment from all parties. However, with a clear vision and well-planned strategic steps, this journey can take us towards a future where technology is not only a tool to generate profits, but also a means to realise a better life for all. Economy 5.0 is about creating a more humane, sustainable and inclusive economy (Bui & Nguyen, 2023).

In addition to close collaboration between various stakeholders, the success of the transformation to Economy 5.0 also depends on a strong digital infrastructure. This includes high-speed internet networks, state-of-the-art data centres and reliable cybersecurity. The development of this infrastructure must be prioritised by both the government and the private sector to ensure that technology can be accessed easily and safely by all citizens. Without adequate digital infrastructure, efforts to adopt advanced technologies will experience many obstacles and will be not able to achieve the desired scale (Wang & Chien, 2012).

It is important also to emphasise that this transformation must take into account ethical and privacy aspects. The use of technologies such as AI and big data often raises concerns related to the privacy rights of individuals. Therefore, strict regulations and policies must be implemented to ensure that the use of these technologies does not compromise privacy and basic human rights. Technology development should be conducted with the principles of transparency and accountability to build trust from the public (Geissdoerfer et al., 2017).

Besides building infrastructure and ensuring the ethical use of technology, there is a need to create an environment conducive to innovation. This can be done through startup , incubationsupport for research and development (R&D), and partnerships between academia and industry. More space needs to be given for young innovators and entrepreneurs to contribute new ideas that can accelerate the transformation to Economy 5.0. The and government private sector are expected to provide adequate financial and logistical support to make this happen (World Bank, 2018).

The . People active role of the community in this transformation process cannot be ignoredshould be encouraged to participate in technology adoption through comprehensive education and digital literacy programmes. Public awareness and understanding of the benefits and risks of new technologies is essential for this transformation to be well received and deliver optimal . resultsCollective awareness can be built through information campaigns, workshops and collaboration with local communities (Schwab, 2016).

Equally important is the readiness of the future workforce. The transformation to Economy 5.0 demands new skills that are not only technical but also adaptive and collaborative. programmes Training and lifelong learning need to be widely implemented to prepare a competent and change-ready workforce. education Technology-integrated and skills development programmes should be the main focus to create excellent human resources (Silva & Santos, 2022).

As such, the transformation to Economy 5.0 is a complex process that requires the co-operation of various elements of society, government, the private sector, and educational institutions. By prioritising ethical technological innovation, environmental sustainability, social inclusiveness, and building a strong digital infrastructure, we can create an economy that is not only efficient and productive, but also more humane and sustainable. This journey, while challenging, offers great opportunities to create a world where technology and economic progress work in harmony with improved human and environmental well-being.

Conclusion

Digitalisation plays an role important in driving sustainability in the era of Economy 5.0, where innovative technologies are used to address environmental and economic issues. With the utilisation of digital , technologiessuch as the Internet of Things (IoT), big data, and artificial intelligence (AI), we can optimise resource use, reduce waste, and create more efficient and sustainable solutions. These initiatives help companies and communities to increase productivity while reducing negative impacts on the environment.

In addition, digitisation enables more transparent and accurate sustainability monitoring and reporting. Digital platforms can facilitate the tracking of carbon footprints, energy use, and waste waste and management, making it easier for stakeholders to make decisions based on accurate data. This transparency encourages companies to improve their business practices, ensuring that they comply with stricter environmental and social standards.

Overall, the integration of digitalisation in sustainability strategies forms the foundation for a greener and more responsible 5.0 Economy. digital solutions Innovative not only provide economic benefits to businesses and society, but also play an role important in preserving the environment for future generations. Thus, the adoption of



Gunawan Widjaja

digital technologies in sustainability management is key to achieving a balance between economic development and environmental protection.

REFERENCES

- Alaslan, A. (2022). QUALITATIVE RESEARCH METHODS. Query date: 2024-05-25 20:59:55. https://doi.org/10.31237/osf.io/2pr4s
- Al-Momani, F., & Alkhatib, A. (2022). IoT and Big Data: Enhancing Environmental Monitoring Systems. Environmental Science and Pollution Research,29 (16), 23023-23037. https://doi.org/10.1007/s11356-022-19223-9
- Antikainen, M., & Valkokari, K. (2016). A Framework for Sustainable Circular Business Model Innovation. *Technology Innovation Management Review*, 6(7), 5–12.
- Banerjee, I., & Banerjee, R. (2022). Role of Digital Transformation in Achieving Circular Economy. *Journal of Enterprise Information Management*,35 (7), 1455-1472. https://doi.org/10.1108/JEIM-03-2021-0154
- Bui, T., & Nguyen, H. (2023). Sustainable Fashion: Evaluating the Impact of Digital Tools. *Journal of Fashion Marketing and Management*, 27 (1), 57-73. https://doi.org/10.1108/JFMM-09-2021-0212
- Chen, X., & Liu, Y. (2022). AI for smart cities. *Smart City Research*,21 (5), 77-90. https://doi.org/10.1016/j.smcity.2022.04.015
- Costa, E., & Ferreira, J. (2022). Digital Circular Economy: Practices and Implications for Sustainability. Sustainability Science, 17 (4), 987-1005. https://doi.org/10.1007/s11625-021-01014-7
- Dawson, R., & Khan, T. (2022). Digital Transformation in Waste Management: Efficiency and Sustainability. *Waste Management*, 145, 260-270. https://doi.org/10.1016/j.wasman.2022.02.039
- Eliasson, J., & Culver, K. (2022). Digital Sustainability in Manufacturing: Case Study of European Firms. *Computers in Industry*, 136, 103561. https://doi.org/10.1016/j.compind.2022.103561
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768.
- Gonzalez, A., & Torra, V. (2023). AI for Environmental Sustainability: An Overview of Advances and Applications. *Artificial Intelligence Review*, 56 (2), 407-426. https://doi.org/10.1007/s10462-022-10057-3
- Jha, P., & Mishra, A. (2022). Integrating AI and IoT for Precision Agriculture. Computers and Electronics in Agriculture,196, 106879. https://doi.org/10.1016/j.compag.2022.106879
- Kim, A. J., & Ko, E. (2012). Do social media marketing activities enhance customer equity? An empirical study of luxury fashion brands. *Journal of Business Research*, 65(10), 1480–1486.
- Kumar, S., & Patel, R. (2022). Edge Computing for Enhancing Renewable Energy Systems. *Renewable Energy*, 194, 1071-1083. https://doi.org/10.1016/j.renene.2022.06.124
- Liu, M. (2021). The Evolution of Land Tenure Systems in China. *China Journal of Land Policy*,41, 365-383. https://doi.org/10.1016/j.cjlp.2021.104225
- OECD. (2019). Digital Innovation: Seizing Policy Opportunities. OECD Publishing.
- Olsen, L., & Farinella, G. (2022). Exploring Blockchain Innovations for Sustainable Supply Chains. Journal of Supply Chain Management, 58 (2), 89-102. https://doi.org/10.1111/jscm.12389
- Patel, R., & Chopra, S. (2022). Leveraging AI for Green Supply Chain Management. Journal of Cleaner Production,356, 131874. https://doi.org/10.1016/j.jclepro.2021.131874
- Pawar, S., & Gupta, A. (2023). Smart Grids as a Catalyst for Sustainable Energy Development. *Renewable Energy*, 205, 743-759. https://doi.org/10.1016/j.renene.2023.01.035
- Pereira, T., & Monteiro, C. (2022). Digital Technologies for a Low-Carbon Economy: A Review. Renewable and Sustainable Energy Reviews,152, 111628. https://doi.org/10.1016/j.rser.2021.111628
- Rahman, M., & Karim, M. (2022). Role of Big Data Analytics in Sustainable Development Goals. *Technology Forecasting and Social Change*,175, 121426. https://doi.org/10.1016/j.techfore.2021.121426
- Rehman, S., & Ahmad, M. (2022). Implementing IoT for Water Resource Management in Smart Cities. Sustainable Cities and Society,82, 103918. https://doi.org/10.1016/j.scs.2022.103918
- Roberts, M., & Clarke, J. (2022). Digitalisation in the Automotive Industry: Enhancing Sustainability. *Transportation Research Part D: Transport and Environment*, 101, 103089. https://doi.org/10.1016/j.trd.2021.103089





Gunawan Widjaja

Schwab, K. (2016). The Fourth Industrial Revolution. World Economic Forum.

- Silva, R., & Santos, M. (2022). The Impact of Digitalisation on Green Innovation in SMEs. *Technology in Society*, 70, 101885. https://doi.org/10.1016/j.techsoc.2022.101885
- Singh, H. (2021). Effective Land Governance for Sustainable Development. *Journal of Governance*, *16*, 140-153. https://doi.org/10.1080/15555645.2021.186300
- Smith, J., & Johnson, M. (2020). Government Policies and Digital Education Initiatives in Developing Countries: A Comparative Analysis. International Journal of Educational Development. https://www.sciencedirect.com/science/article/pii/S0738059320301820
- Suyitno. (2021). QUALITATIVE RESEARCH METHODS CONCEPTS, PRINCIPLES AND OPERATIONS. Query date: 2024-05-25 20:59:55. https://doi.org/10.31219/osf.io/auqfr
- Wang, Y. W., & Chien, H.-T. L. (2012). Internet marketing and consumers' purchase intentions. *International Journal of Business and Social Science*, 3 (22), 60-68. https://doi.org/10.2139/ssrn.3440500
- Wekke, I. S. (2020). Qualitative Research Design. Query date: 2024-05-25 20:59:55. https://doi.org/10.31219/osf.io/4q8pz
- World Bank. (2018). World Development Report 2018: Learning to Realise Education's Promise. World Bank Publications.
- Yang, S., & Wu, J. (2023). Advancements in 5G Networks for Sustainable Smart City Development. Sustainable Computing: Informatics and Systems, 37, 100793. https://doi.org/10.1016/j.suscom.2022.100793

