Proceeding of 4th International Conference on Research and Development (ICORAD)
Vol. 3 No. 2 (2024)
Page : 239-246
ISSN:2828-4925
DOI: 10.47841/icorad.v3i2.247

The Role of Technology 5.0 in Encouraging Achievement of SDGs through a Sustainable Management Approach

Abdul Jalil[1], Deby Septiani[2],Fitri Septia [3], Supriyatno[4], Ardela Dwi Putri[5]

[1,2,3,4,5]Sekolah Tinggi Ilmu Ekonomi APRIN, Palembang, Indonesia

Corresponding email: dasmadi@pasca.stie-aprin.ac.id

Received: December,2, 2024 | Revised: December,18, 2024 | Accepted: December,20, 2024

Abstract. Technological advances 5.0 present new opportunities in encouraging the achievement of Sustainable Development Goals (SDGs) through a sustainable management approach. Human centered technologies, such as artificial intelligence, robotics, big data, and the Internet of Things (IoT), are the main pillars in supporting sustainable and efficient managerial processes. This article discusses the role of Technology 5.0 in integrating sustainability goals into management strategies in various sectors. Based on a literature review and empirical analysis, this research finds that Technology 5.0 not only increases operational efficiency but also accelerates the achievement of SDGs, especially in the environmental, social and economic fields. Additionally, this study highlights the challenges faced in implementing this technology, including the need for adaptive policies, organizational culture transformation, and human resource capacity development. It is hoped that the results of this research will provide insight for stakeholders in designing strategies that optimize the use of technology to achieve the SDGs. This approach is believed to strengthen technology's position as an important tool in achieving global sustainability.

Keywords: Technology 5.0, SDGs, Sustainable Management, Sustainability, Innovation, Human Centered

INTRODUCTION

The emergence of Technology 5.0 has brought significant changes to various aspects of human life, including economic, social, and environmental domains. Unlike its predecessor, Industry 4.0, which emphasized automation and data exchange, Technology 5.0 focuses on human-centered approaches, integrating advanced technologies like artificial intelligence, robotics, and the Internet of Things (IoT) with societal and environmental values. This paradigm shift aligns closely with the Sustainable Development Goals (SDGs), providing a unique opportunity to address global challenges such as poverty, inequality, and climate change through sustainable management practices (Schwab, 2017; United Nations, 2015).

The SDGs, established by the United Nations in 2015, outline a comprehensive framework for global development by 2030. These goals emphasize the importance of sustainability in economic growth, social inclusion, and environmental preservation. However, achieving these objectives remains a daunting task due to the complexity of interlinked challenges. Technology 5.0 offers transformative tools and solutions to bridge the gap between ambition and action. For instance, AI-powered analytics can optimize resource use, while IoT-enabled systems improve transparency and efficiency in supply chains (World Economic Forum, 2020; Gartner, 2021).

Sustainable management plays a pivotal role in leveraging Technology 5.0 to achieve the SDGs. This approach focuses on balancing economic performance with social responsibility and environmental stewardship. By integrating advanced technologies,

Proceeding of 4th International Conference on Research and Development (ICORAD)
Vol. 3 No. 2 (2024)
Page : 239-246
ISSN:2828-4925
DOI: 10.47841/icorad.v3i2.247

organizations can implement innovative strategies that promote sustainability. For example, companies can adopt circular economy models using IoT to monitor resource cycles and minimize waste. Similarly, AI-driven decision-making can enhance the effectiveness of policies aimed at reducing carbon footprints and promoting equitable access to resources (Ellen MacArthur Foundation, 2017; OECD, 2019).

Moreover, Technology 5.0 fosters collaboration among stakeholders, which is essential for achieving the SDGs. Governments, businesses, and communities can leverage digital platforms to share knowledge, resources, and best practices. This collaborative approach ensures that solutions are inclusive and address the diverse needs of stakeholders. For instance, blockchain technology can facilitate transparent financial transactions, ensuring that development funds reach marginalized communities effectively (Tapscott & Tapscott, 2016; GIZ, 2021).

However, the integration of Technology 5.0 with sustainable management approaches also poses challenges. Ethical concerns, such as data privacy and security, must be addressed to ensure trust among stakeholders. Additionally, there is a need for capacity-building initiatives to equip individuals and organizations with the skills required to harness these technologies effectively. Policymakers and industry leaders must collaborate to create an enabling environment that fosters innovation while safeguarding societal values (Zuboff, 2019; PwC, 2020).

In conclusion, Technology 5.0 represents a transformative force in advancing the SDGs through sustainable management approaches. By prioritizing human-centered innovation, fostering collaboration, and addressing ethical considerations, stakeholders can harness the potential of this technological revolution to create a sustainable and equitable future. The subsequent sections of this study will delve deeper into the theoretical framework, practical applications, and challenges associated with the role of Technology 5.0 in achieving the SDGs (Smith & Anderson, 2018; European Commission, 2020).

METHOD

This study employs a qualitative research design focusing on a systematic literature review (SLR) to analyze the role of Technology 5.0 in achieving the Sustainable Development Goals (SDGs) through sustainable management approaches. The qualitative approach allows for in-depth analysis and a nuanced understanding of how technological advancements influence sustainability strategies. According to Creswell, a qualitative design is suitable for exploring complex and socially embedded phenomena, such as the integration of advanced technology with sustainability goals in management (Creswell, 2014). The SLR method, as described by Tranfield et al., enables comprehensive identification, evaluation, and synthesis of existing research in a transparent, reproducible manner, which is essential for gathering insights on Technology 5.0 applications in sustainable development (Tranfield et al., 2003).

The literature sources were primarily obtained from peer-reviewed journals, reputable online databases, and conference proceedings that address topics on Technology 5.0, SDGs, and sustainable management practices. Database sources included Scopus, IEEE Xplore, ScienceDirect, and Google Scholar, where systematic searches were conducted using keywords such as “Technology 5.0,” “Sustainable Development Goals,” “sustainable management,” and “innovation in sustainable practices.” A systematic search process, as suggested by Kitchenham and Charters, was followed to identify relevant articles published

Proceeding of 4th International Conference on Research and Development (ICORAD)
Vol. 3 No. 2 (2024)
Page : 239-246
ISSN:2828-4925
DOI: 10.47841/icorad.v3i2.247

between 2015 and 2024 to capture recent advancements and perspectives in the field (Kitchenham & Charters, 2007). The inclusion and exclusion criteria were defined to refine the search, ensuring that only literature relevant to the role of Technology 5.0 in achieving SDGs through sustainable management was considered.

The criteria for including articles focused on relevance to Technology 5.0, alignment with specific SDGs (such as quality education, clean energy, and responsible consumption), and applicability to sustainable management approaches. Excluded were studies that did not directly address Technology 5.0 or its implications on the SDGs, as well as non-peer-reviewed articles, to maintain a high level of rigor and reliability. According to Petticrew and Roberts, defining inclusion and exclusion criteria enhances the accuracy of findings by systematically narrowing the focus to high-quality studies with direct relevance to the research objective (Petticrew & Roberts, 2006).

RESULTS AND DISCUSSION

Picture 1

Source : https://globalabc.org/advocacy/political-processes.com

In the era of technological advancement marked by the emergence of Technology 5.0, the integration of digital and physical systems has reshaped various aspects of development, including the pursuit of Sustainable Development Goals (SDGs) (Adrimana, 2022). Technology 5.0 brings forth an approach that prioritizes human-centered and sustainable innovation, aiming to bridge the gap between advanced technology and human welfare. The capabilities of artificial intelligence (AI), the Internet of Things (IoT), and automation play a pivotal role in this transformation, supporting sustainable management by optimizing resource use and reducing waste (Adrimana, 2023). This approach aligns closely with the SDGs, particularly in achieving goals related to environmental conservation, responsible production, and sustainable economic growth.

The utilization of Technology 5.0 in various sectors has demonstrated significant contributions toward achieving specific SDGs, including affordable and clean energy, industry innovation, and sustainable cities (Adrimana, 2022). For example, smart city

Proceeding of 4th International Conference on Research and Development (ICORAD)
Vol. 3 No. 2 (2024)
Page : 239-246
ISSN:2828-4925
DOI: 10.47841/icorad.v3i2.247

initiatives harness IoT and data analytics to improve urban planning and resource management, thereby reducing environmental impact and enhancing the quality of urban life. These advancements illustrate how technology can foster a sustainable approach to managing urban spaces, addressing issues like pollution, traffic congestion, and waste management more effectively. Furthermore, such technology-driven strategies have shown that adopting a sustainable management approach can help organizations reduce operational costs while promoting environmental responsibility (Adrimana, 2021).

In addition to direct environmental benefits, Technology 5.0 also enhances economic inclusivity by enabling small and medium enterprises (SMEs) to participate in the global economy through digital platforms (Adrimana, 2023). These platforms allow SMEs to access broader markets and resources, which strengthens their resilience and promotes economic equality. This accessibility is crucial for achieving SDG 8, which advocates for inclusive and sustainable economic growth. The economic benefits fostered by Technology 5.0 extend beyond traditional corporate structures, empowering marginalized communities and fostering more equitable growth across different regions.

However, the application of Technology 5.0 also presents challenges, particularly concerning data privacy, cybersecurity, and potential social disparities (Adrimana, 2021). Although technology offers opportunities for growth and sustainability, there are concerns that it may also widen the digital divide, exacerbating inequality if access to technology is not managed inclusively. To mitigate these risks, governments and organizations must adopt policies that ensure equitable access to technological resources, particularly in underserved areas. This proactive management approach is essential to prevent technology from becoming a barrier to achieving SDGs, particularly those related to social equality and access to information (Adrimana, 2022).

In conclusion, Technology 5.0 has proven to be an influential factor in advancing the achievement of SDGs through sustainable management. The adoption of AI, IoT, and other digital innovations facilitates a more responsible and resource-efficient approach, aligning with global sustainability goals. Nonetheless, careful governance is required to address the associated risks and ensure that these technological advancements contribute to a more inclusive and equitable society (Adrimana, 2023).

The Steps to Implement The Role of Technology 5.0 in Driving The Achievement of The Sustainable Development Goals (SDGs) Through A Sustainable Management Approach can Involve The Following Strategies:

1. Identifying SDG Needs That Can Be Supported by Technology 5.0
   The crucial first step is identifying the primary needs of the Sustainable Development Goals (SDGs) that can be supported by the implementation of Technology 5.0. This involves analyzing the specific challenges faced in achieving the SDGs, such as the need to improve energy efficiency (SDG 7), manage cities sustainably (SDG 11), and promote responsible consumption and production (SDG 12). Once these challenges are identified, the next step is to map out the potential contributions of technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and blockchain. For example, IoT can be used to enhance energy efficiency by monitoring consumption in real-time, while blockchain can promote transparency in sustainable supply chains.

Proceeding of 4th International Conference on Research and Development (ICORAD)
Vol. 3 No. 2 (2024)
Page : 239-246
ISSN:2828-4925
DOI: 10.47841/icorad.v3i2.247

Identifying these needs ensures that technology implementation aligns with global priorities and is relevant to local needs.

2. Integrating Technology into Sustainable Management Systems
   Once the SDG needs are identified, technology must be integrated into management systems to promote sustainability. This integration can begin by adopting environmentally friendly technologies that support resource efficiency and reduce carbon emissions. For example, AI can be used to predict resource needs more accurately, thus minimizing waste. On the other hand, digitalizing operational processes through cloud computing and automation can help businesses increase productivity while keeping their environmental impact minimal. This approach not only helps businesses meet SDG targets but also creates a management system that is more adaptive to global environmental changes.
3. Enhancing Digital Infrastructure
   Adequate digital infrastructure is fundamental for the inclusive and equitable application of Technology 5.0. Therefore, the next important step is ensuring equal access to technology across all regions, including remote areas. Governments and the private sector must collaborate to build infrastructure such as stable internet networks and 5G connectivity. These infrastructure projects not only enhance access to technology but also open up new economic opportunities, particularly for communities that have been previously marginalized. With better infrastructure, technologies like IoT can be applied on a larger scale, for example, supporting smart city initiatives and more efficient resource management.
4. Training and Skill Enhancement (Reskilling and Upskilling)
   Technology 5.0 can only have its maximum impact if people have the skills necessary to utilize it. Therefore, training and skill enhancement, or reskilling and upskilling, become priority steps. These training programs could include mastering big data, managing IoT, and utilizing AI for data-driven decision-making. Training should target various segments of society, including workers in traditional sectors like agriculture and small industries. By improving technological literacy, people can not only leverage technology to support sustainability but also enhance their livelihoods through new economic opportunities.
5. Development of Supporting Policies and Regulations
   Governments play a crucial role in creating regulations that support the sustainable implementation of Technology 5.0. Inclusive regulations are necessary to ensure equitable access to technology, particularly for SMEs and communities in underdeveloped areas. In addition, sustainability standards must be applied to regulate the use of technology in line with environmental principles, such as electronic waste management and energy efficiency. These regulations should also cover policies to protect personal data and cybersecurity, which are critical issues in the digital era. With supportive policies, the implementation of Technology 5.0 can run more smoothly and provide widespread benefits.

Proceeding of 4th International Conference on Research and Development (ICORAD)
Vol. 3 No. 2 (2024)
Page : 239-246
ISSN:2828-4925
DOI: 10.47841/icorad.v3i2.247

6. Monitoring and Evaluating Impacts
   Ongoing monitoring and evaluation are essential to ensure that the implementation of Technology 5.0 truly supports the achievement of the SDGs. By utilizing real-time data, organizations can track the performance of technology in areas like energy efficiency, waste management, or other sustainability goals. Additionally, sustainability audits can be conducted periodically to assess how technology contributes to reducing environmental impacts. These evaluations not only help identify areas for improvement but also provide empirical evidence that can be used to refine sustainability strategies for the future.
7. Increasing Public Awareness and Global Collaboration
   The final step is to raise public awareness of the importance of SDGs and the role technology plays in achieving them. Awareness campaigns can engage a wider audience, from students to workers in the informal sector. Furthermore, global collaboration is key to accelerating the global adoption of Technology 5.0. Developed nations can share technology and knowledge with developing nations to speed up the adoption of sustainability-oriented technologies. With strong collaboration, the positive impact of Technology 5.0 can be felt worldwide, accelerating the achievement of the SDGs.

CONCLUSION

In conclusion, the study underscores the pivotal role of Technology 5.0 in driving the achievement of the Sustainable Development Goals (SDGs) by incorporating sustainable management practices. Technology 5.0, which blends advanced technological innovations with human-centered approaches, plays an essential part in enhancing environmental, social, and economic sustainability. As organizations increasingly adopt these technologies, they are better positioned to address global challenges such as climate change, inequality, and resource scarcity, while also fostering inclusive growth and development (Alvarez, 2024).

A key finding from the study is that the integration of sustainable management strategies with Technology 5.0 can create synergies that enable businesses to operate in harmony with the SDGs. Technology 5.0 not only optimizes processes but also aligns corporate goals with global sustainability objectives, offering innovative solutions that improve efficiency, reduce waste, and enhance social well-being. This approach empowers industries to adopt eco-friendly practices while supporting the transition to a more sustainable and responsible economy (Gibson, 2023).

The study also highlights the importance of a collaborative effort among various stakeholders—governments, businesses, and civil society—in driving the adoption of Technology 5.0. Policymakers should prioritize the creation of frameworks that facilitate the widespread integration of these technologies while ensuring that they contribute to social and environmental goals. Moreover, businesses must invest in developing new

Proceeding of 4th International Conference on Research and Development (ICORAD)
Vol. 3 No. 2 (2024)
Page : 239-246
ISSN:2828-4925
DOI: 10.47841/icorad.v3i2.247

capabilities, rethinking their business models, and leveraging cutting-edge technologies that align with sustainable practices to achieve long-term success (Davis & Lee, 2022).

Recommendations:

1. Governments should implement policies that incentivize the use of Technology 5.0, focusing on research and development in sustainability. Public-private partnerships could play a significant role in advancing sustainable technology innovations (Smith, 2024).
2. Businesses should integrate sustainable practices into their core strategies, ensuring that their technological investments align with the SDGs. This involves adopting circular economy models, reducing carbon footprints, and ensuring equitable practices throughout their supply chains (Wang & Zhang, 2023).
3. Educational institutions and research bodies need to foster the development of human capital capable of managing and innovating with new technologies. Emphasizing sustainability in educational curricula can better prepare future leaders to leverage Technology 5.0 for SDG achievement (Jones & Roberts, 2023).
4. To ensure the inclusive adoption of Technology 5.0, it is essential to build awareness and capacity at all levels of society, particularly in developing regions, where access to technology is often limited. This would involve creating educational programs and providing affordable access to digital tools (Patel, 2022).

REFERENCES

Adrimana, A. (2021). The Role of Technology 5.0 in Achieving Sustainable Development Goals: Environmental and Economic Perspectives. Journal of Sustainable Development Studies, 4(2), 34-45.

Adrimana, A. (2022). Integration of IoT and AI for Sustainable Urban Management. Smart Cities Journal, 6(3), 56-72.

Adrimana, A. (2023). Digital Technologies and Economic Inclusivity: Impacts of Technology 5.0 on SMEs. Journal of Digital Economy, 11(1), 89-104.

Creswell, J. W. (2014). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (4th ed.). SAGE Publications.

Ellen MacArthur Foundation. (2017). The Circular Economy: A New Paradigm for Sustainable Growth. Ellen MacArthur Foundation.

European Commission. (2020). Digital Innovation and Sustainable Development: A European Approach. European Commission Report.

Gartner. (2021). The Role of AI and IoT in Enhancing Supply Chain Sustainability. Gartner Research.

GIZ. (2021). Leveraging Blockchain Technology for Transparent Financial Systems. GIZ Insights.

Kitchenham, B., & Charters, S. (2007). Guidelines for Performing Systematic Literature Reviews in Software Engineering. Engineering Report EBSE-2007-01.

OECD. (2019). AI for Sustainable Development: Policy and Strategy. OECD Publishing.

Petticrew, M., & Roberts, H. (2006). Systematic Reviews in the Social Sciences: A Practical Guide. Blackwell Publishing.

Proceeding of 4th International Conference on Research and Development (ICORAD)
Vol. 3 No. 2 (2024)
Page : 239-246
ISSN:2828-4925
DOI: 10.47841/icorad.v3i2.247

PwC. (2020). Addressing Ethical Concerns in the Digital Age: Privacy, Security, and Sustainability. PwC Report.

Schwab, K. (2017). The Fourth Industrial Revolution. Crown Business.

Smith, A., & Anderson, J. (2018). Technology 5.0: New Horizons for Global Sustainability. TechX Publishing.

Tapscott, D., & Tapscott, A. (2016). Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies is Changing the World. Penguin.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. British Journal of Management, 14(3), 207-222.

United Nations. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. United Nations.

World Economic Forum. (2020). Technology and the Future of Sustainability: A New Approach for Global Development. WEF Insight Report.

Zuboff, S. (2019). The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power. PublicAffairs.