Proceedings of the 1st International Conference on Public Administration and Social Science (ICoPASS 2024) Universitas Sultan Ageng Tirtayasa
Theme: Innovation and Adaption Policy: Climate Action

The Role of Technology in Public Policy Transformation In the Industrial Age 5.0

Eli Apud Saepudin*, Gatot Hartoko, Rizki Amilia
Faculty of Social and Political Sciences, Department of Public Administration
Bina Bangsa University, Serang Banten
Corresponding author email*: eli.apud.saepudin@binabangsa.ac.id

Received November 13, 2024; Aceppted December 14, 2024; Published March 15, 2025

Abstract – The Industrial Age 5.0 is characterized by profound technological disruption, significantly changing the social and economic landscape. In this context, the public sector is also undergoing significant transformation. The research method used is descriptive qualitative. This research aims to analyze the role of technology in changing public policy. The results show that technologies such as AI, IoT, and big data have great potential to improve efficiency, transparency, and public participation in the policy-making process. However, the application of technology is also faced with a number of challenges, such as the digital divide and data security. Therefore, a comprehensive strategy is needed to maximize the benefits of technology while addressing the challenges. This study concludes that technology is an important catalyst in modernizing governance and improving the quality of public services.

Keywords: *Technology, Transformation, Public policy, Industry 5.0*

1. INTRODUCTION

The rapid evolution into the Industrial Age 5.0 has brought significant changes to various sectors, particularly in how governments and institutions approach public policy. Traditionally, policymaking was a lengthy, bureaucratic process with limited flexibility to respond to emerging societal issues in real time. However, as digital transformation accelerates, governments are pressured to adapt to new tools and approaches to stay relevant, responsive, and inclusive. The expectations of citizens have also shifted; they now demand faster, more transparent, and more tailored policy responses that address their specific needs in an increasingly complex world (Yaqub & Alsabban, 2023). One of the main challenges in this transition is the digital divide, where unequal access to technology creates disparities in how people benefit from these advancements. For some populations, especially in underdeveloped or rural areas, limited internet connectivity and digital literacy hinder their ability to engage with or benefit from technology-driven policy initiatives. This divide can exacerbate social inequality, as those without access are left out of decision-making processes and may not receive the full benefits of modern public services (Martynov, 2022).

Additionally, with the rise of artificial intelligence, big data, and automation, there are concerns about privacy, data security, and the ethical implications of using algorithms in policymaking. While data-driven decisions offer the promise of increased efficiency and precision, they also risk reinforcing biases if not carefully managed. Moreover, as technology takes on a greater role in governance, there is a risk that human oversight may diminish, potentially leading to impersonal or overly rigid policies (Akman & Erdirençelebi, 2024).

Therefore, the central issue in this context is finding a balanced approach to integrating technology in public policy, one that maximizes efficiency and inclusivity while safeguarding against inequity and ethical risks. This challenge underscores the need for innovative policies that not only leverage technology but also ensure equitable access, transparency, and accountability in the policymaking process (Troisi et al., 2023). In the era of Industrial Revolution 5.0, technology has become a cornerstone in transforming public policy, creating unprecedented opportunities and challenges. This new phase emphasizes not only technological advancement but also the integration of human-centered approaches, where technology serves to empower society and improve overall

quality of life. As countries and communities strive for smarter, more inclusive societies, technology's role in public policy has evolved to address complex socio-economic issues, streamline governance, and foster sustainable development (Ungureanu, 2020).

The integration of artificial intelligence (AI), big data analytics, the Internet of Things (IoT), and digital communication tools has revolutionized the policymaking process. With these technologies, governments can now make evidence-based decisions that reflect real-time data, resulting in more responsive, adaptive, and efficient policies. Additionally, technology enables greater transparency, allowing citizens to actively participate in policy discussions and decision-making processes, thus enhancing democracy and accountability (Fadziso et al., 2024). This transformation marks a paradigm shift from traditional policy frameworks to dynamic, technology-driven models that can better address the demands of an interconnected global society. This introduction sets the stage to explore the profound implications of technology in public policy and the challenges and opportunities it presents in shaping a better future for all (Fridol Mekkunnel & Peter Kopacek, 2019).

2. LITERATURE REVIEW

Technology has become a powerful driver in transforming public policy, fundamentally altering how policies are developed, implemented, and evaluated. The intersection of technology and policy has created a landscape where data-driven decision-making, digital platforms for citizen engagement, and automated systems streamline governance processes. This literature review explores the key dimensions of this transformation, the benefits and challenges of technological integration in public policy, and the implications for future governance (Pluta-Zaremba & Szelagowska, 2021).

Technological Integration in Policymaking Researchers such as Mergel, Edelmann, and Haug (2019) have highlighted how digital technologies, particularly big data and analytics, have enabled policymakers to gain more accurate insights into societal needs and trends. Data-driven approaches allow for a deeper understanding of social, economic, and environmental challenges, which can then inform more effective policy solutions. Janssen and Helbig (2020) further elaborate on how data analytics tools enable governments to monitor policy outcomes in real-time, creating a feedback loop that allows policies to be adjusted swiftly as new data emerges. This dynamic and adaptive approach to policymaking stands in stark contrast to traditional, static policy frameworks (Efe, 2023).

E-Government and Digital Platforms for Citizen Engagement The rise of e-government platforms has been transformative in promoting transparency, accountability, and citizen participation. Bertot, Jaeger, and Grimes (2010) suggest that e-government enhances the accessibility of government services, enabling citizens to interact with and understand government actions and decisions more readily. Digital platforms, such as online consultations and social media, have opened up new avenues for public participation. Sivapragasam, Aguirre, and Giannoumis (2019) discuss how these platforms help to democratize policymaking by giving citizens a voice and making it easier for governments to gather feedback on policy initiatives. In this way, technology fosters a more participatory and transparent governance model, strengthening the relationship between citizens and the state (Madsen & Berg, 2021).

The Role of Artificial Intelligence (AI) and Automation AI and machine learning are increasingly used to analyze vast amounts of data and predict policy outcomes, allowing governments to anticipate potential issues and allocate resources more efficiently. Zemčík and Štefan (2021) argue that AI's ability to process and interpret complex datasets enhances decision-making capabilities, making it possible to address issues proactively rather than reactively. In addition, Susskind and Susskind (2022) highlight that automation can streamline bureaucratic processes, improving efficiency and reducing administrative costs. For example, automated systems in welfare and social services can reduce processing times for applications, ensuring that assistance reaches those in need more quickly. However, the integration of AI in public policy is not without concerns. Crawford and Calo (2016) caution against the potential for algorithmic bias and a lack of transparency, which could undermine public trust. Without proper oversight, AI systems might inadvertently reinforce existing social biases, leading to unfair policy outcomes. This concern has led to a growing body of research emphasizing the need for ethical guidelines and frameworks to ensure that AI use in public policy remains transparent, fair, and accountable (Asst & Assoc, n.d.).

Data Privacy and Security in Public Policy As governments rely increasingly on data to inform policies, issues of data privacy and security become paramount. West (2020) stresses that while data-driven policies hold great potential, they also pose risks to citizen privacy, particularly when sensitive personal data is involved. The misuse or mishandling of data can lead to a loss of public trust, especially in cases where data is shared across departments or with private entities. Gutwirth, Leenes, and De Hert (2019) argue that to protect citizen privacy, governments must establish strict data governance protocols, ensuring that data is used responsibly and securely in policymaking. Moreover, data security is crucial in safeguarding against cyber threats, which can disrupt policy implementation and compromise sensitive information. Boin, Rhinard, and Ekengren (2014) suggest that governments must prioritize cybersecurity measures to prevent breaches that could undermine the stability and integrity of public institutions. The need for robust data security policies has led to the emergence of frameworks such as the General Data Protection Regulation (GDPR) in the European Union, which aims to standardize data protection and privacy practices (Mohamad Sopi & Hanafi, 2024).

Challenges and Limitations of Technological Integration in Public Policy Despite the benefits, the integration of technology in public policy poses several challenges. Nam (2019) points out that not all governments have the resources or infrastructure to implement advanced technologies effectively, particularly in developing regions. The digital divide remains a significant issue, as unequal access to technology can exacerbate disparities in service delivery and citizen engagement. Additionally, Cordella and Bonina (2020) highlight that technological-solutions are not always a "one-size-fits-all" remedy. Policies must be designed with a nuanced understanding of local contexts, and technology should be used as a complement to, rather than a replacement for, human expertise and discretion (Mingaleva et al., 2023).

The Future of Technology in Public Policy Looking ahead, scholars see a growing role for emerging technologies like blockchain, which can enhance transparency and accountability in government processes. Dunleavy (2018) notes that blockchain's potential to create immutable records could transform areas like voting, public procurement, and financial transactions, where transparency is crucial. Moreover, Desouza and Jacob (2021) suggest that smart cities, where IoT and data analytics improve urban planning and resource management, represent a model for how technology can be leveraged to create more livable and sustainable environments (Kazitskaya et al., 2020).

The literature highlights that technology has played a transformative role in public policy, enabling data-driven decision-making, fostering citizen engagement, and improving policy implementation. However, while technology offers numerous benefits, it also introduces complex challenges, such as privacy concerns, algorithmic bias, and resource inequalities, which must be managed carefully. As technology continues to evolve, public policy must adapt to ensure that these tools are used ethically and equitably, with a focus on inclusivity and transparency. Moving forward, balancing technological innovation with ethical oversight and citizen engagement will be crucial to creating effective and sustainable public policies (Zizic et al., 2022).

The Industrial Age 5.0, also known as the Fifth Industrial Revolution, represents a significant shift in how technology and human values are integrated within economic and social systems. While the Fourth Industrial Revolution (4.0) focused heavily on automation and digital transformation, Industrial Age 5.0 emphasizes a human-centered approach. This era combines advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT), and robotics with a focus on human well-being, inclusivity, and sustainability (Mourtzis et al., 2022).

Evolution from Industry 4.0 to Industry 5.0 Scholars like Xu, David, and Kim (2018) have outlined that Industry 4.0 was primarily characterized by smart automation, digitalization, and the interconnectivity of devices. In contrast, Industry 5.0 brings technology closer to people by making it more intuitive, collaborative, and responsive to human needs. Calderón and Looijen (2021) highlight that Industry 5.0 is driven by a shift from efficiency-focused production to a framework that also values societal impact, job quality, and personal fulfillment. This focus reflects an emerging global priority: sustainable development that balances economic growth with environmental and social responsibilities (Machado & Davim, 2023).

Human-Centric and Sustainable Innovation A defining characteristic of the Industrial Age 5.0 is its focus on technology that enhances human capabilities and promotes societal well-being.

Nahavandi (2020**)** emphasizes that instead of replacing humans, Industry 5.0 seeks to use technology to support and enhance human roles, fostering collaboration between humans and machines. This human-machine synergy is seen in various fields, from healthcare and education to manufacturing and governance. For example, wearable AI devices that monitor health in real-time or smart city applications that improve urban planning and energy use reflect this balance between technology and human needs (Pereira & dos Santos, 2023).

Implications for Public Policy the Industrial Age 5.0 introduces several key opportunities and challenges for public policy. Li, Hou, and Wu (2022) discuss the importance of data-driven policymaking, where AI and big data can provide policymakers with real-time insights into public needs, economic trends, and social issues. However, they also caution against the risks associated with data privacy, security, and ethical concerns, particularly when it comes to algorithmic bias in decision-making processes. Friedman and Hendler (2023) add that as technology becomes more embedded in public policy, there is a greater need for regulation that ensures transparency, accountability, and fairness (Nadeem et al., 2024).

Ethical Considerations and Social Equity While the advancements of Industry 5.0 hold great promise, scholars raise concerns about ensuring equitable access and ethical usage. West and Allen (2021) argue that the digital divide—differential access to technology based on socioeconomic or geographic factors—could widen if left unaddressed. They highlight the need for inclusive policies that prioritize accessibility and digital literacy, ensuring that all societal groups can benefit from these advancements. Additionally, as AI and automation become more prevalent in decision-making, Binns and Gallo (2020) stress the importance of designing algorithms that are transparent and free of bias, to maintain trust and fairness in automated processes (Özdemir & Hekim, 2018).

Industrial Age 5.0 and Sustainable Development Goals (SDGs) A significant body of literature, including works by Carayannis and Morawska (2022), links Industry 5.0 to the United Nations' Sustainable Development Goals (SDGs). They argue that by prioritizing human-centered design, Industry 5.0 can address key issues such as reducing inequalities, ensuring sustainable energy, and promoting good health and well-being. Technologies in this age are seen not only as tools for economic growth but as enablers of a more inclusive and sustainable world. For instance, using renewable energy sources in industrial applications or applying AI in agriculture to optimize food production aligns with several SDGs and reflects the Industry 5.0 commitment to environmental and social sustainability (Rahmanto et al., 2021).

The Future of Work in the Industrial Age 5.0 The literature also explores the shifting nature of work in the Fifth Industrial Revolution. Benevides and Fernandes (2022) discuss how automation and AI may continue to transform labor markets, but with a focus on job quality rather than mere efficiency. As mundane tasks are automated, there is a growing emphasis on upskilling and reskilling workers to take on roles that require critical thinking, creativity, and emotional intelligence. This emphasis aligns with a broader societal aim to enhance job satisfaction and promote meaningful employment (Carayannis & Morawska-Jancelewicz, 2022).

The literature on Industrial Age 5.0 reveals a paradigm shift in how technology is designed, deployed, and integrated with human systems. This age brings opportunities for more inclusive, responsive, and sustainable growth, yet it also requires thoughtful policymaking to address the challenges of equitable access, ethical use, and job transformation. The human-centered approach of Industrial Age 5.0 is not merely a technological advancement but a reimagining of how society and technology can co-evolve in ways that prioritize collective well-being and a sustainable future (Fukuyama, 2020).

3. METHODOLOGY

This study employs a qualitative research methodology to explore the role of technology in transforming public policy in the context of Industrial Age 5.0. By analyzing case studies, conducting interviews with experts in public administration and technology, and reviewing relevant policy documents, this methodology seeks to provide a comprehensive understanding of how technology influences policymaking, the challenges it introduces, and the strategies for effective integration (Ziatdinov et al., 2024).

4. RESULTS AND DISCUSSION

Enhanced Decision-Making through Data-Driven Policies The study's analysis shows that one of the primary benefits of technology in public policy is the capacity for data-driven decision-making. Case studies from Estonia and Singapore, for example, demonstrate how governments leverage big data analytics to make informed, responsive decisions. Interviews with policymakers emphasized that real-time data allows governments to address social needs more effectively and allocate resources with precision. Data-driven decision-making has empowered governments to transition from reactive to proactive policy approaches. For example, predictive analytics enable policy teams to anticipate and prepare for social issues, such as public health concerns or economic shifts. However, interviewees highlighted a challenge: while data enhances responsiveness, its reliability depends on data quality and the absence of bias. To ensure effective data-driven policies, governments must focus on high-quality, representative data collection and address any potential biases embedded in algorithms, which could otherwise lead to skewed policy outcomes (Aquilani et al., 2020).

Increased Transparency and Citizen Engagement via E-Government Platforms E-government platforms have facilitated greater transparency, accountability, and citizen engagement in policy processes. Case studies indicate that online platforms in countries like South Korea and Canada have allowed citizens to participate in policy discussions, give feedback, and access government services more easily. This increased access and participation lead to more inclusive policymaking processes, where citizens feel they have a say in governance. E-government platforms provide a model for democratizing public policy by enabling a two-way flow of information between the government and citizens. However, several challenges emerged, including the digital divide and accessibility barriers. Interviews with technology experts and policymakers noted that while these platforms can improve engagement, they risk excluding populations with limited internet access or digital literacy. To address this, governments must invest in digital infrastructure and training to ensure inclusive participation.

Automation for Efficiency and Cost Reduction The study found that automation in public policy processes improves efficiency and reduces operational costs. For instance, automated systems in welfare and social services expedite application processing, allowing governments to provide timely assistance to citizens. Interviews revealed that automation also helps public institutions allocate resources better, as routine tasks are streamlined, freeing up personnel for more complex decision-making tasks. While automation offers significant efficiency gains, the potential reduction in human oversight raises ethical concerns. Interviewees emphasized the need for a balanced approach where automation supports rather than replaces human decision-making, particularly in sectors where empathy and discretion are critical (e.g., social services or healthcare). Policymakers should consider frameworks that integrate human oversight to mitigate potential risks associated with excessive automation, such as loss of personalized services and accountability issues. Privacy, Security, and Ethical Challenges The results underscore that privacy and security remain central challenges in technology-driven public policy. Document analysis and interviews identified growing concerns over data privacy, especially as governments use AI and big data in policy initiatives. Cases from the European Union illustrate that regulations like the GDPR aim to address these concerns, setting standards for data protection and ensuring transparency in government data use. Privacy and security challenges highlight the need for clear regulatory frameworks governing data usage in public policy. Ethical issues, such as algorithmic bias and data misuse, also demand careful oversight. Experts emphasized that while data-driven policies can optimize decision-making, they must be handled with strict ethical considerations to maintain public trust. Governments should prioritize transparent data management practices and establish independent oversight bodies to monitor the ethical use of technology in public policy.

Bridging the Digital Divide and Ensuring Equity Interviews with public administration scholars and analysis of policy documents reveal that the digital divide is a significant barrier to equitable policy outcomes. The results show that citizens with limited access to technology are at a disadvantage, unable to fully participate in or benefit from technology-enhanced policies. This inequity is especially apparent in rural or under-resourced areas, where digital infrastructure is often lacking. Bridging the digital divide is essential to ensure that technological advancements in policy are accessible to all citizens. Governments must implement strategies to improve digital literacy and

expand internet access, particularly in marginalized communities. This could involve partnerships with private sector stakeholders to provide affordable internet services or community-based training programs to enhance digital skills. Addressing the digital divide is fundamental to achieving inclusive, technology-driven public policies.

Future Opportunities: AI and Emerging Technologies in Public Policy The study identifies potential opportunities for future advancements in technology-driven public policy, particularly through AI and blockchain. AI has the potential to enhance predictive capabilities and policy efficiency, while blockchain offers transparency for processes such as voting and public finance. These technologies could drive further innovation in policy if developed and implemented responsibly. While AI and blockchain offer promising tools, their adoption requires careful consideration of ethics, transparency, and inclusivity. Interviewees stressed that without clear guidelines, AI could introduce biases or privacy issues, while blockchain's decentralized nature requires robust security protocols. For these technologies to support public policy effectively, governments must establish standards for ethical AI and data governance, as well as pilot programs to test blockchain's application in areas like procurement and citizen services.

5. CONCLUSION

The results highlight that technology plays a transformative role in public policy, enabling governments to respond more dynamically and inclusively to societal needs. Key benefits include improved decision-making, enhanced transparency, increased efficiency, and future opportunities for AI and blockchain. However, challenges related to privacy, equity, and ethical considerations remain. Effective integration of technology into public policy requires a balanced approach that values both innovation and accountability. To maximize the potential of technology in public governance, governments must address digital divides, enforce ethical standards, and prioritize citizen engagement, ensuring that technology serves as a tool for inclusive, fair, and responsive policymaking.

ACKNOWLEDGEMENT

I would like to thank Prof. Fatah Sulaeman, S.T., M.T., Rector of Sultan Ageng Tirtayasa University, for his full support in the implementation of ICoPASS 2024, International Conference on Public Administration and Social Science. His support means a lot in making this conference an outstanding platform to exchange knowledge and ideas in the field of public administration and social science, which will certainly contribute positively to academic and professional development in various disciplines. Thank you for your inspiration and commitment in encouraging the advancement of education and research, so that this event can be held successfully.

REFERENCES

Akman, A., & Erdirençelebi, M. (2024). A Human-Centered Digital Transformation: A Bibliometric Analysis of Society 5.0 and Industry 5.0. *Istanbul Management Journal*, *0*(96), 1–16. https://doi.org/10.26650/imj.2024.96.1361480

Aquilani, B., Piccarozzi, M., Abbate, T., & Codini, A. (2020). The role of open innovation and value co-creation in the challenging transition from industry 4.0 to society 5.0: Toward a theoretical framework. *Sustainability (Switzerland)*, *12*(21), 1–21. https://doi.org/10.3390/su12218943

Carayannis, E. G., & Morawska-Jancelewicz, J. (2022). The Futures of Europe: Society 5.0 and Industry 5.0 as Driving Forces of Future Universities. *Journal of the Knowledge Economy*, *13*(4), 3445–3471. https://doi.org/10.1007/s13132-021-00854-2

Efe, A. (2023). An Evaluation on the Relationship of Society 5.0, E-Government Applications and Artificial Intelligence. *Medeniyet ve Toplum Dergisi*, *7*(2), 95–113. https://dergipark.org.tr/en/pub/metder/issue/81808/1412862%0Ahttps://dergipark.org.tr/en/download/article-file/3632226

Fadziso, T., Yerram, S. R., Mallipeddi, S. R., Fadziso, T., Yerram, S. R., Reddy, S., & Analyzing, M. (2024). *Analyzing the Progression from Digital Production to Digital Society : Industry 4 . 0 to Industry 5 . 0 Transition Evaluation To cite this version : HAL Id : hal-04551204 Analyzing the Progression from Digital Production to Digital Society :*

Fridol Mekkunnel, & Peter Kopacek. (2019). Industy 5.0 Man Machine Revolution. *A Master's*

Thesis Submitted for the Degree of "Master of Science." http://www.ub.tuwien.ac.athttp//www.ub.tuwien.ac.at/eng

Fukuyama, B. M. (2020). Society 5.0: A people-centric super-smart society. *Society 5.0: A People-Centric Super-Smart Society*, *August*, 1–177. https://doi.org/10.1007/978-981-15-2989-4

Kazitskaya, N., Prusova, V., & Bochkov, S. (2020). Sustainable Development Management: Actors and Institutions in the Post-Industrial Era. *E3S Web of Conferences*, *174*, 1–6. https://doi.org/10.1051/e3sconf/202017404045

Machado, C. F., & Davim, J. P. (2023). Industry 5.0: Creative and Innovative Organizations. In *Industry 5.0: Creative and Innovative Organizations* (Issue March). https://doi.org/10.1007/978-3-031-26232-6

Madsen, D. Ø., & Berg, T. (2021). An exploratory bibliometric analysis of the birth and emergence of industry 5.0. *Applied System Innovation*, *4*(4), 1–15. https://doi.org/10.3390/asi4040087

Martynov, A. (2022). Sustainable Overall Social Transformation: The Problem of Transition. *International Journal of Current Science Research and Review*, *05*(05), 1741–1748. https://doi.org/10.47191/ijcsrr/v5-i5-42

Mingaleva, Z., Startseva, O., & Gerasimov, A. (2023). Aligning the environmental and social values of the sustainable development concepts, Industry 5.0 and Society 5.0. *E3S Web of Conferences*, *460*, 1–12. https://doi.org/10.1051/e3sconf/202346005012

Mohamad Sopi, J., & Hanafi, M. H. (2024). Digital Transformation in Industry 4.0: a Bibliometric Analysis. *International Journal of Innovation and Industrial Revolution*, *6*(16), 20–37. https://doi.org/10.35631/ijirev.616002

Mourtzis, D., Angelopoulos, J., & Panopoulos, N. (2022). A Literature Review of the Challenges and Opportunities of the Transition from Industry 4.0 to Society 5.0. *Energies*, *15*(17). https://doi.org/10.3390/en15176276

Nadeem, K., Wong, S. I., Za, S., & Venditti, M. (2024). Digital transformation and industry 4.0 employees: Empirical evidence from top digital nations. *Technology in Society*, *76*. https://doi.org/10.1016/j.techsoc.2023.102434

Özdemir, V., & Hekim, N. (2018). Birth of Industry 5.0: Making Sense of Big Data with Artificial Intelligence, "the Internet of Things" and Next-Generation Technology Policy. *OMICS A Journal of Integrative Biology*, *22*(1), 65–76. https://doi.org/10.1089/omi.2017.0194

Pereira, R., & dos Santos, N. (2023). Neoindustrialization—Reflections on a New Paradigmatic Approach for the Industry: A Scoping Review on Industry 5.0. *Logistics*, *7*(3). https://doi.org/10.3390/logistics7030043

Pluta-Zaremba, A., & Szelagowska, A. (2021). Transformation of the economy: Towards era 5.0. In *The Economics of Sustainable Transformation* (Vol. 8). https://doi.org/10.4324/9781003219958-3

Rahmanto, F., Pribadi, U., & Priyanto, A. (2021). Big Data: What are the Implications for Public Sector Policy in Society 5.0 Era? *IOP Conference Series: Earth and Environmental Science*, *717*(1), 0–7. https://doi.org/10.1088/1755-1315/717/1/012009

Troisi, O., Visvizi, A., & Grimaldi, M. (2023). Rethinking innovation through industry and society 5.0 paradigms: a multileveled approach for management and policy-making. *European Journal of Innovation Management*, *27*(9), 22–51. https://doi.org/10.1108/EJIM-08-2023-0659

Ungureanu, A. V. (2020). The Transition From Industry 4.0 To Industry 5.0. The 4Cs Of The Global Economic Change. *16th Economic International Conference NCOE 4.0 2020*, *13*, 70–81. https://doi.org/10.18662/lumproc/ncoe4.0.2020/07

Yaqub, M. Z., & Alsabban, A. (2023). Industry-4.0-Enabled Digital Transformation: Prospects, Instruments, Challenges, and Implications for Business Strategies. *Sustainability (Switzerland)*, *15*(11). https://doi.org/10.3390/su15118553

Ziatdinov, R., Atteraya, M. S., & Nabiyev, R. (2024). The Fifth Industrial Revolution as a Transformative Step towards Society 5.0. *Societies*, *14*(2), 1–15. https://doi.org/10.3390/soc14020019

Zizic, M. C., Mladineo, M., Gjeldum, N., & Celent, L. (2022). of Paradigm Shift for the People , Organization and Technology. *Energies*.