



The Transformation of the Indonesian Market in the Digital Era 5.0: The Role of Artificial Intelligence (AI) and the Internet of Things (IoT) in Driving Economic Growth

Citra Mulya Sari^{1*}, Tegar Tegar², Nila Nafisatul Bashiroh³, and Silvi Armadhita⁴

^{1,2,3,4} Sayyid Ali Rahmatullah Tulungagung State Islamic University, East Java, Indonesia
citramulyasari@uinsatu.ac.id

Abstract. The Indonesian market in the Digital 5.0 era is growing through utilization advanced system, including artificial intelligence (AI) meets the Internet of Things (IoT). This development is essential to supporting sustainable nor equitable expansion of the economy. The purpose of this study is to conduct An analysis the influence of artificial intelligence and the Internet Things applications on strategic sectors in Indonesia, including manufacturing, agriculture, trade and public services. This study also examines the function of digital technology in enhancing organizational effectiveness broadening market reach, and generating new job opportunities through products and services. Research results show that the internet of things and artificial intelligence (IoT) not only boost efficiency and productivity, but also have the potential to accelerate financial inclusion to bolster Indonesian's competitiveness in the global market. However, issues like the digital divide and the requirement for adaptive regulation are priorities that must be addressed to ensure that these changes have a positive impact on all levels of society. Keywords: Digital 5.0, Internet of Things (IoT), Artificial Intelligence (AI), Market Transformation, Economic Growth, Indonesia.

Keywords: Digital 5.0, Internet of Things (IoT), Artificial Intelligence (AI), market transformation, economic growth, Indonesia.

1 Introduction

Rapid technological progress in the digital era demands all professional fields to continuously improve their ways of working efficiently and accurately. This progress is closely related to artificial intelligence, commonly known as AI or artificial knowledge, which significantly impacts all areas of work [1]. The implementation can be seen in various uses types of Artificial Intelligence (AI), often referred to as artificial intelligence, the Internet of Things (IoT), and a wide range of software, computerization, robotics, and other automation technologies. This phenomenon can be described as a revolution due to its significant impact on the global ecosystem and its potential to substantially improve the quality of life. As the information regarding Society 5.0 has been widely circulated, this concept, developed by Japan, focuses on being human-

centered with a technology-based approach [5]. Society 5.0 was created as a development of Industry 4.0, which was perceived to diminish the role of humans [2]. The balance between economic progress and solving social issues through the integration of the real and virtual worlds is the core vision of Society 5.0. Artificial intelligence can serve as a powerful tool in transforming big data, which is obtained through various sources of the internet in all aspects of life (The Internet of Things). The expected outcome is an enhancement of human competence that offers great opportunities for humanity [2].

The gap between Industry 4.0 and Industry 5.0 reflects the rapid technological advancements and their impact on various aspects of societal life [8]. Industry 4.0, referred to as the fourth industrial revolution, is defined by the combination of cyber-physical systems, the Internet of Things, and automation within manufacturing technologies. [3]. The main focus of Industry 5.0 is to optimize the production process and increase efficiency through the application of technology. Industry 5.0 is expected to restore the human element to the industrial sector by promoting collaboration and reintroducing human input into the creation of products, while also focusing on sustainable manufacturing practices. The shift from Industry 4.0 to Industry 5.0 highlights the need to address the limitations of Industry 4.0 and develop a more sustainable, human-centered approach to production [8]. This gap also emphasizes the importance of having a national strategy and policy to support the development of Industry 5.0 technology and make sure that the advantages of this technology are accessible fairly by all communities. The Society 5.0 era reflects the necessity to address the constraints of Industry 4.0 and develop a more sustainable and human-centered approach to production [3].

Industry 5.0 highlights the utilization of cutting-edge technologies such as artificial intelligence (AI) and the Internet of Things (IoT) to enhance efficiency and productivity, with the aim of creating higher added value and more personalized experiences for customers. Digital marketing in the age of Industry 5.0 is not only about reaching a broader audience through digital platforms but also about creating deeper and more meaningful interactions between companies and customers. More sophisticated human-machine interactions allow companies to offer more personalized and tailored customer experiences, which in turn can enhance customer satisfaction and foster loyalty. The objectives of digital marketing vary depending on different business needs and strategies [4].

Technological advancements such as artificial intelligence (AI) and the Internet of Things (IoT) play a key role in this transformation. AI, with its ability to process data and make automated decisions, has permeated various sectors, including education, business, and digital security. On the other hand, IoT connects devices and systems to enhance efficiency and innovation through smarter automation and monitoring. In the business sector, AI functions to improve operational efficiency, expand markets, and open new opportunities for SMEs. However, the adoption of AI in business also brings ethical challenges, for instance, the utilization of personal data and information security. IoT plays a role in automating industrial procedures and enhancing efficiency through better monitoring and control. This technology supports innovation and boosts productivity across various industrial sectors [5].

Amid the transition towards Society 5.0, an era marked by the integration of technological advancements and social needs, developing economies face unprecedented challenges. The Industry 5.0 revolution not only brings innovations in the form of artificial intelligence (AI) and IoT technology but also demands a paradigm shift in traditional business practices. AI and IoT have initiated a transformation in how business data is collected, analyzed, and reported [6].

The digital economy is continuously growing worldwide, including in Indonesia, as evidenced by the increasing total amount of internet users. At the start of 2021, the number of internet users in Indonesia reached 202.6 million, marking a 15.5 percent increase, or 27 million more, compared to January 2020. With Indonesia's total population at 274.9 million, this means that internet penetration in the country stood at 73.7 percent at the beginning of 2021. The digital economy itself signifies the expansion and development of broader and more accessible economic transactions by utilizing internet services as a medium for communication and collaboration between individuals and companies [7].

Following the growth of Indonesia's digital economy, several sectors have the potential to boost the economy. First, the financial sector. This sector is one of the most resilient to advances in information and communications technology (ICT). The banking industry, in particular, prioritizes the use of technology, information, and communication to serve customers. SMS banking, mobile banking, online banking, etc., have become popular banking services in recent years. Many people have started using these digital services in large numbers due to the numerous benefits and conveniences they offer. Moreover, the rapid growth of startups in Indonesia has given rise to a variety of financial application services that make it easier for entrepreneurs to access the capital they need.

Second, the cultural, tourism, and creative industries. It's easy to see that the tourism and creative industries are closely linked to culture. This synergy is evident when cultural attractions are located in tourist areas, allowing both domestic and foreign tourists to participate in local culture. Indirectly, showcasing local creations that are memorable serves as a driving force for the creative industry, offering products that are marketable. Various creative economic ideas for tourist destinations emerge from here, such as batik production that attracts tourists. In the future, this can lead to increased sales of batik, which can be traded through digital e-commerce platforms. These sectors are anticipated to drive economic growth, provided they are backed by skilled human resources and advanced digital technology.

Third is the agricultural sector. Agribusiness has also experienced rapid technological advancements, with the emergence of many sophisticated technologies across various fields. As a result, farmers are gradually shifting from traditional farming models to digital farming models to adapt to current developments. These challenges have motivated many entrepreneurs in Indonesia to develop a more modern and simplified agricultural industry. Agricultural stakeholders can now interact digitally in all production activities, including with consumers, traders, suppliers, and retailers [8].

By gaining a more thorough understanding of how the latest technologies can be implemented in digital marketing, companies can be better prepared to face challenges and seize opportunities that arise in the Industry 5.0 era. Therefore, this research is

expected to contribute to the creation of more efficient and sustainable digital marketing strategies that can foster business growth and success in the future.

2 Literature Review

2.1 The Role of AI

Artificial intelligence (AI) is a field within computer science that can be utilized in various fields, including libraries. Many people associate artificial intelligence solely with robotics; however, AI encompasses a wide range of areas and does not exclusively focus on robotics [9]. Artificial intelligence refers to the ability of computers to learn and adapt from data, as well as to make decisions automatically without human intervention. This capability has brought significant changes in how information systems are implemented, operated, and utilized [10].

According to [10], Artificial intelligence (AI), implemented in the form of machines that mimic Various aspects of human intelligence are being increasingly applied in the service sector and is and has become a key driver of innovation. For instance, robots for the home, have automated numerous tasks in industries like healthcare, hotels, and restaurants aspects of our lives. Virtual robots have transformed transforming customer service into self-service experiences. AI and Big Data applications are now substituting for portfolio managers, while social robots like Pepper are taking on roles traditionally held by human greeters. in customer-facing services. [11].

In this rapidly evolving digital era, artificial intelligence (AI) has become one of the key technologies influencing various aspects of human life. One area significantly impacted by the application of AI is business process automation. The role of AI in business process automation involves various advanced technologies including technologies like machine learning, natural language processing, and computer vision. For example, in the manufacturing sector, AI can be used to monitor machines and equipment, predict failures, and automatically schedule maintenance [12].

AI technology, data analytics, and blockchain have indeed emerged as significant forces in reshaping traditional accounting practices. AI-powered algorithms can automate data entry, analyze financial trends, and enhance decision-making. Despite many challenges, AI technology is continuously reshaping the accounting industry by influencing audit processes, customer advancement, creativity, expansion, and customization of cloud-based systems. As organizations continue to implement AI, they need to overcome these challenges so that implementation is successful and the benefits of AI in business practices can be optimized. [13].

2.2 The Development of AI in Indonesia

The presence of the internet in Indonesia, which has permeated all segments of society, has had a significant impact on everyone. Technological advancements have transformed mass media from conventional or offline formats to digital. The development of technology and the internet has greatly affected communication patterns and the

daily lifestyles of people. The trend of seeking news has also shifted to an online basis. The capabilities of digital technology have begun to captivate human life by enabling messages to be conveyed more efficiently, making it easier to find the latest information, and facilitating the building of community networks beyond existing ones. The use of artificial intelligence technology in Southeast Asia is experiencing rapid growth, with Indonesia leading this positive trend. This aligns with the findings of a survey regarding AI prospects in Southeast Asia conducted by SAS and IDP Asia/Pacific in 2008. The AI adoption rate in Southeast Asia reached 14 percent in 2008, an increase from 8 percent in the previous year [14].

Currently, the development of artificial intelligence (AI) is increasingly being applied across various aspects of life. The abundance of extensive datasets for training AI and advancements in affordable high computing power are driving the growth of AI. The term AI was first introduced in the 1950s during the Dartmouth Summer Research Workshop on Artificial Intelligence in 1956. Since then, innovators and researchers have published over 1.6 million scientific publications related to AI and filed for nearly 340,000 patents related to AI inventions. Artificial Intelligence (AI) is a field within computer science dedicated to creating systems that can imitate human thinking abilities. AI involves the application of algorithms and computational techniques that allow machines or computers to "learn lessons" from data, analyze information, make decisions and carry out tasks autonomously that require intelligent thinking [15].

The development of AI in Indonesia reflects the global evolution in the field. Although Indonesia has not yet become a major player in AI research and development, the country has witnessed significant growth in recent years. The development of AI has a rich history in Indonesia began in the late 20th century and has continued to evolve alongside global advancements in the field. In the early 2000s, AI in Indonesia was still relatively limited and focused on specific areas such as voice recognition and natural language processing. Several universities began to introduce AI courses within computer science programs.

By the 2010s, there was an increased awareness of AI's potential in Indonesia. Technology companies and startups began developing AI applications across various sectors, including e-commerce, finance, healthcare, and logistics [15]. The increased accessibility to AI resources such as hardware and programming libraries has helped drive AI development in Indonesia (1 Year Making Indonesia 4.0, n.d.).

In 2018, the Indonesian government introduced the "Making Indonesia 4.0" initiative, encouraging the use of smart technologies, including AI, to enhance industrial competitiveness. This move sparked increased interest in AI and led to the establishment of research centers and technology incubators in Indonesia. The following year (2019), the Ministry of Communication and Information Technology of Indonesia unveiled the National AI Roadmap aimed at developing AI capabilities in the country. This roadmap includes efforts to enhance AI research and development, train human resources, establish supportive regulations, and foster collaboration between the public and private sectors (1 Year Making Indonesia 4.0, n.d.).

By 2020, AI increasingly became a focal point across various sectors in Indonesia. Large companies and startups were adopting AI technologies to improve efficiency,

innovation, and customer service. There was a rise in the number of conferences, seminars, and AI communities in Indonesia, promoting knowledge exchange and collaboration among experts and practitioners [16].

Indonesia, as the most populous country in Southeast Asia, is preparing to enter Society 5.0. The Society 5.0 concept, initially proposed by Japan, promotes a vision of a society based on smart technology aimed at enhancing quality of life and tackling various social issues by integrating technologies, including AI. The growing interest of the Indonesian public in AI is a key focus, given the significant potential and implications it offers. In this context, understanding public interest trends in AI will provide valuable insights for the development of the Society 5.0 concept in Indonesia. This information can be utilized to guide efforts in developing smart technologies, designing appropriate policies, and increasing public understanding of the advantages and challenges of utilizing this technology [17].

2.3 The Role of IoT (Internet of Things)

Kevin Ashton is the figure who introduced the term Internet of Things (IoT). According to Kevin Ashton in his book *Making Sense of IoT*, the Internet of Things consists of sensors that are connected to the internet and behave like the internet by creating open connections at all times, enabling them to share data in real-time [1].

According to Margaret Rouse, The Internet of Things (IoT) is defined as a network that links computing devices, digital machines, mechanical systems, and objects, and living things such as humans or animals, which are equipped with unique identifiers and are able to transmit data through the network without the need for humans. -with humans or human-to-human interaction. Meanwhile, Banafa defines IoT as a platform consisting of hardware and software that seamlessly interact with one another to connect everyday things to the internet, allowing for the collection and exchange of information. [18].

The Internet of Things (IoT) refers to the integration of digital information technology with physical objects in the real world. This is accomplished by equipping objects with sensors that collect real-world events as data, which is subsequently transmitted to a server system [19].

According to Sugiyono, the IoT concept is actually quite simple, operating based on three main elements in the IoT architecture: Physical Objects equipped with IoT modules, Internet connection devices like modems and wireless routers, and cloud data centers where applications and databases are hosted. In the early stages of IoT implementation, identifiers used to enable objects to be recognized and read by computers included barcodes, QR codes, and Radio Frequency Identification (RFID) [20].

2.4 Development of IoT in Indonesia

In 1990, John Ramkey collaborated with Simon Hackett to create a device in the form of a toaster that was connected to the internet using TCP or IP networks and controlled via the Simple Network Management Protocol (SNMP MIB) with a single control to turn on the power. However, humans still had to insert the bread into the device. In

1999, this device was further developed by adding an interop or small crane robot that could also be controlled over the internet, allowing it to pick up and drop the bread into the toaster. In the same year, Kevin Ashton, the executive director of the Auto ID Centre at MIT, coined the phrase "The Internet of Things" [21].

This discovery can be described as a significant leap in the commercialization of IoT. In 2000, LG (Lucky Goldstar) revealed plans to develop a smart refrigerator capable of automatically assessing whether the food inside needed replenishing. By 2003, RFID (Radio Frequency Identification) technology began to be implemented in high-level military programs in the U.S., and that same year, RFID was also introduced in various stores to enhance efficiency.

In 2005, publications such as *The Guardian*, *Boston Globe*, and *Scientific American* published numerous articles about IoT, raising public awareness of this technology. The year 2008 marked the launch of the IPSO Alliance, aimed at promoting the application of Internet Protocol (IP) in networks of smart objects, facilitating the growth of the Internet of Things. That year also saw the use of white space spectrum, which was also approved by the FCC, paving the way for more IoT devices to connect to the internet. Rapid developments continued in 2011 with the launch of IPv6, which enabled significant growth in the field of IoT, thanks to a much larger address capacity. Major companies like IBM, Cisco, and Ericsson took initiatives in educating and commercializing IoT technology, explaining that IoT represents a close relationship between computers and humans. Today, although IoT technology is still in its early stages in Indonesia, many startups and local tech companies are beginning to develop IoT solutions to improve efficiency across various sectors, such as agriculture, healthcare, and industry [21].

As stated by the Director of Digital Economy Protection at BSSN, Anton Setiyawan, by October 2020, there were around 31 million connected IoT devices, and it is estimated that the IoT ecosystem in 2021 will surpass the number of smartphones circulating in Indonesia. Johnny added that the market value of IoT in Indonesia is also expected to increase from IDR 355 trillion in 2022 to IDR 557 trillion by 2025. The use of Internet of Things technology in Indonesia will continue to grow and accelerate even more with the advent of 5G. The adoption of IoT across various industrial sectors will help address various issues, and the increasing emphasis on the concepts of smart cities and smart homes will further encourage the integration of IoT technology into daily life [22].

2.5 Revolution 5.0

Industrial Revolution 5.0 is commonly known as the era of Society 5.0, a vision of a society capable of addressing various social challenges by leveraging the innovations from Industrial Revolution 4.0. These innovations, which include technologies like the Internet of Things (IoT), artificial intelligence (AI), Big Data, and robotics, are designed to enhance human well-being and quality of life. Society 5.0 also emphasizes a human-centered approach, with technology serving as a supporting foundation. [23].

The development of Revolution 5.0 has brought significant changes to people's lives. One of its effects is the growing preference for using technology to fulfill daily needs,

driven by the convenience it provides. This shift marks the transition into the era of Industrial Revolution 5.0 and Society 5.0 in Indonesia. E-commerce has emerged as a key example of technological advancement in the country, effectively meeting the needs of the community [24].

The development of Industry 5.0 holds significant potential in driving Indonesia's economic growth. Data shows that the implementation of Industry 5.0 technology can enhance productivity, efficiency, and innovation across various sectors. Although there may be changes in the types of jobs required, Industry 5.0 can also have a positive impact on job creation. The application of this technology tends to accelerate digital transformation and increase the demand for relevant new skills. Investment in technology and infrastructure that supports Industry 5.0 can attract foreign direct investment (FDI) and strengthen Indonesia's competitiveness in the global market [25].

3 Methods

The method used in this article is library research, which involves collecting data through understanding and theoretical studies from various literature relevant to the research. This library research consists of four stages: preparing the necessary tools, compiling a list of libraries to be used, managing research time, and reading and recording relevant materials [26]. The literature research referred to in this case includes a literature review that discusses digital transformation in the context of Market 5.0, as well as the role of artificial intelligence (AI) and the Internet of Things (IoT).

The research method used in this study is a descriptive analytical study with a qualitative approach. Qualitative research is descriptive and analytical, where descriptive means describing and explaining events, phenomena and social situations studied, while analysis involves interpreting and comparing data obtained from research [27]. The data collection technique used in this paper is documentation, where the author collects references in the form of books and journals that are relevant to the title of this paper. Subsequently, the author analyzes these books and journals to draw conclusions related to the research theme [28]. The data analysis technique used in this paper involves data reduction, which is the simplification of the collected data. This is followed by data presentation, which entails presenting the data that has been previously reduced, and verification or conclusion drawing from the obtained data that relates to the theme of the paper [29].

The data source for this research is secondary data. Secondary data refers to data obtained indirectly from the research subject [30]. The researcher obtains pre-existing data that has been collected by other parties using various methods, both commercial and non-commercial. Secondary data can be obtained from various sources, such as the Central Statistics Agency (BPS), books, reports, journals and other sources. This secondary data collection can be done through observation or documentation [31].

4 Results and Discussion

The implementation of artificial intelligence (AI) and digital transformation provides significant benefits for SMEs (Small and Medium Enterprises) in Indonesia. One of the main benefits is the enhancement of operational efficiency. AI can assist SMEs in automating various tasks, ranging from inventory management and customer data analysis to automated customer service. This not only increases productivity but also allows for a greater focus on innovation and product development. Moreover, digital transformation expands market access for SMEs. Through e-commerce platforms and digital marketing, SMEs can reach a broader consumer base, even reaching consumers nationwide and globally. Advanced data analysis also helps SMEs understand market trends, customer preferences, and compete more effectively. The adoption of AI technology also simplifies financial processes and payments, strengthening the competitiveness of SMEs in the digital economy era. [32].

Indonesia, with its large population, significant economic growth, and the need to enhance industrial competitiveness, has great potential to adopt and implement Industry 5.0. In the context of Indonesia, the application Industry 5.0 has great potential to enhance operational efficiency, boost productivity, and generate added value in the industrial sector. In addition, Industry 5.0 can also have a positive impact on sustainable economic development, create new job opportunities and improve people's quality of life [25].

Technology will play a crucial role in Society 5.0. The application of robotics and IoT will have a significant impact in the Society 5.0 era. As the Internet of Things grows, its applications will become increasingly important, business owners in Society 5.0 must also become more creative in developing their companies. Specifically, in the context of Society 5.0, digital commerce enables financial transactions even when parties do not meet physically. Leaders in the digital industry must also be inventive and creative due to the rapid and diverse changes in the market. Digital businesses are always evolving, bringing both opportunities and challenges. These online business opportunities allow entrepreneurs to market and sell their products using online media and platforms that are frequently used by the general public [33].

In a press release by the Coordinating Ministry for Economic Affairs, it was stated that various developed countries have successfully utilized Digital Technologies like Artificial Intelligence (AI), IoT, Blockchain, and even Semiconductors play a vital role in driving substantial economic growth. Essentially, these countries have strong technological infrastructure, supportive government policies, and large technology companies. Indonesia's digital competitiveness is targeted to rank 20th by 2045, and the contribution of Indonesia's digital economy to GDP must also reach at least 20% by 2045 [34].

In Indonesia, it is evident that the digital economy has made a significant contribution to Indonesia's GDP. This indicates that Indonesia's digital economy has very promising prospects if managed well, as its growth outpaces that of the Indonesian economy. Indonesia is experiencing an overall increase in the digital economy, which positively impacts the national economy [35].

Digital transformation in Indonesia is growing with the application of artificial intelligence, which specifically has a positive impact on Micro, Small and Medium Enterprises (SMEs) in Indonesia are increasingly utilizing AI to enhance their operations, improve efficiency, and stay competitive in the market. has provided innovative solutions to improve operational efficiency, competitiveness and the ability to adapt to market changes. One of the key aspects of AI integration is its ability to analyze big data and provide valuable insights for SMEs [32].

The role of IoT in e-commerce is that the Internet of Things (IoT) can drive the growth of big data storage concepts and integrated data storage media (data centers) that can be accessed remotely. This allows data-driven business actors to manage their businesses using devices connected to information systems, improving business performance and increasing revenue [20]. With this, AI and IoT directly contribute to economic growth through the enhancement of SME operations, increasing industrial competitiveness, and driving the growth of new sectors. The potential of the digital economy is immense and continues to evolve over time, especially with the advent of the 5.0 digital economy era. To optimize this potential, several sectors affected by the digital economy include financial technology (Fintech), e-commerce, insurance, banking, healthcare, industry, education, urban mobility, and agriculture [35]. One application of IoT in e-commerce is Tokopedia. Its implementation includes monitoring stock and product conditions in warehouses, augmented reality (AR) and virtual reality (VR), enhancing delivery efficiency, providing more relevant product recommendations for users, and managing the supply chain [20].

Industry 5.0 can have a positive impact in creating jobs, even with changes in the type of work required. The adoption of Industry 5.0 technologies is expected to accelerate digital transformation and increase the demand for related new skills. Investments in technology and infrastructure that support Industry 5.0 can attract foreign direct investment (FDI) and increase Indonesia's competitiveness in the global market [25]. As the digital economy grows, the national economy will also experience growth.

5 Conclusion

The change in the Indonesian marketplace in the Digital 5.0 era centers on the influence of the Internet of Things (IoT) meets artificial intelligence (AI) in fostering economic growth. This digital shift has brought considerable positive effects, particularly for Small, Medium, and Micro Enterprises (SMEs), by enhancing operational efficiency, broadening market access, and boosting competitiveness. However, challenges such as the digital divide and the necessity for adaptive regulations need to be tackled to ensure that the benefits of technology are distributed equitably across society. The Industrial Era 5.0 emphasizes the importance of collaboration between people and technology to create added value and a more personalized customer experience. AI and IoT play crucial roles in automation, innovation, and data management, which can support sustainable economic development and accelerate financial inclusion. Nevertheless, the adoption of this technology also brings ethical challenges related to privacy and data security. The implementation of digital technology in Indonesia has great potential to drive

economic growth and global competitiveness, but appropriate strategies are needed to ensure that this transformation provides inclusive benefits.

Acknowledgments. Praise be to Allah SWT, who has granted strength, health, and knowledge, enabling the completion of this paper. Shalawat and salam may continuously be sent upon Prophet Muhammad SAW, his family, companions, and all his followers until the end of time. With the utmost gratitude, the writer would like to express sincere appreciation to the Faculty of Islamic Economics and Business at UIN Sayyid Ali Rahmatullah Tulungagung. For providing a platform and opportunities for the author to develop academic knowledge and skills. The author also thanks the lecturers who have guided and imparted knowledge and inspiration throughout the course of study. Without the support of the faculty, this paper would not have been completed well. The author also expresses gratitude to parents, family, and friends who have continuously provided moral support and prayers at every step taken. May all the hard work and efforts put forth receive the best rewards from Allah SWT. Ameen.

Disclosure of Interests. The authors declare that they have no conflicts of interest that could affect the objectivity or integrity of this article. There is no financial support, professional relationships, or ownership involvement related to companies, institutions, or organizations that could create conflicts of interest in the publication of this article. All authors are committed to presenting this research honestly and transparently, without external influences that could affect the conclusions or interpretations made.

References

1. H. H. Rumahorbo dan T. Dewayanto, "Pengaruh Transformasi Digital: Kecerdasan Buatan Dan Internet of Things Terhadap Peran Dan Praktik Audit Internal: Systematic Literature Review," *Diponegoro J. Account.*, vol. 12, no. 4, hal. 1–15, 2024, [Daring]. Tersedia pada: <http://ejournal-s1.undip.ac.id/index.php/accounting>
2. M. I. T. B. N. Sumadi, R. Putra, dan A. Firmansyah, "Peran Perkembangan Teknologi Pada Profesi Akuntan Dalam Menghadapi Industri 4.0 Dan Society 5.0," *J. Law, Adm. Soc. Sci.*, vol. 2, no. 1, hal. 56–68, 2022, doi: 10.54957/jolas.v2i1.162.
3. A. Aman, T. Joko Raharjo, dan T. Supriyanto, "Prosiding Seminar Nasional Pascasarjana Peran dan Strategi Perguruan Tinggi dalam Membentuk SDM Unggul yang Berjiwa Creativepreneurship di Era Society 5.0," *Semin. Nas. Pascasarj. Univ. Negeri Semarang*, hal. hal. 7-12, 2023, [Daring]. Tersedia pada: <http://pps.unnes.ac.id/pps2/prodi/prosiding-pascasarjana-unnes>
4. V. Maria, V. Maria Universitas Sultan Ageng Tirtayasa Nabylla Zahra Universitas Sultan Ageng Tirtayasa, U. Sultan Ageng Tirtayasa Alamat, J. Raya Jakarta, K. Serang, dan P. Banten, "Digital Marketing Strategy in the Industry 5.0 Era," *J. Penelit. Manaj. dan Inov. Ris.*, vol. 2, no. 4, hal. 117–127, 2024, [Daring]. Tersedia pada: <https://doi.org/10.61132/lo-kawati.v2i4.1005>
5. S. Muhammad Alvin Maulidana Firdaus Putra, Deborah Kurniawati, Pulut Suryati, "Integrasi Kecerdasan Buatan Dalam Berbagai Sektor: Dampak, Peluang, Dan Tantangan," *JCI (Jurnal Cakrawala Ilmiah)*, vol. 3, no. 12, hal. 3831–3838, 2024.
6. N. Y. Erni Setiawati, Siti Rohmah, "Tantangan Profesi Akuntan Di Era Society 5.0; Integrasi Inovasi Artificial Intelligence (Ai) Dan Internet of Things (Iot) Dalam Akuntansi," *J. Econ. Bus. Eng. (JEBO) GEOEKONOMI*, vol. 15, no. 1, hal. 31–41, 2024.

7. I. R. Aysa, "Tantangan Transformasi Digital Bagi Kemajuan Perekonomian Indonesia," *J. At-Tamwil Kaji. Ekon. Syariah*, vol. 3, no. 2, hal. 140–153, 2021, doi: 10.33367/at.v2i3.1458.
8. N. Rahayu, I. Agus Supriyono, dan E. Mulyawan, "Pembangunan Ekonomi Indonesia Dengan Tantangan Transformasi Digital," *ADI Bisnis Digit. Interdisiplin J.*, vol. 4, no. 1, hal. 92–95, 2022, doi: 10.34306/abdi.v4i1.823.
9. A. O. P. Dewi, "Kecerdasan Buatan sebagai Konsep Baru pada Perpustakaan," *Anuva J. Kaji. Budaya, Perpustakaan, dan Inf.*, vol. 4, no. 4, hal. 453–460, 2020, doi: 10.14710/anuva.4.4.453-460.
10. M. Ully, Baharuddin, Abraham Manuhutu, dan Heru Widoyo, "Penerapan Kecerdasan Buatan Dalam Sistem Informasi: Tinjauan Literatur Tentang Aplikasi, Etika, Dan Dampak Sosial," *Rev. Pendidik. dan Pengajaran*, vol. 6, hal. 3–7, 2023.
11. A. Zein, "Kecerdasan Buatan Dalam Hal Otomatisasi Layanan," *J. Ilmu Komput. JIK*, vol. 4, no. 2, hal. 18, 2021.
12. R. Novianti, K. P. Ningsih, D. Haryadi, G. Chrisnawati, N. Anripa, dan O. P. Bisnis, "31125-Article Text-102718-1-10-20240711," vol. 7, hal. 9320–9329, 2024.
13. T. P. Nugrahanti, N. Puspitasari, dan I. R. Andaningsih, "Transformasi Praktik Akuntansi Melalui Teknologi: Peran Kecerdasan Buatan, Analisis Data, dan Blockchain dalam Otomatisasi Proses Akuntansi," *J. Akunt. Dan Keuang. West Sci.*, vol. 2, no. 03, hal. 213–221, 2023, doi: 10.58812/jakws.v2i03.644.
14. I. Saidah, "Model Industri Bisnis Media Massa Pada Era Perkembangan Artificial Intelligence (Ai) Di Indonesia," *Linimasa J. Ilmu Komun.*, vol. 4, no. 1, hal. 44–59, 2024, doi: 10.23969/linimasa.v4i1.3461.
15. A. J. Gema, "Masalah Penggunaan Ciptaan Sebagai Data Masukan Dalam Pengembangan Artificial Intelligence Di Indonesia," *J. Huk. Pembang.*, vol. 1, no. 1, 2022, doi: 10.21143/telj.vol1.no1.1000.
16. F. A. Hanifa, Ahmad Sholihin, "Peran Ai Terhadap Kinerja Industri Kreatif Di Indonesia," *J. Sains Komprehensif*, vol. 13, no. 1, hal. 104–116, 2023.
17. S. A. A. Kharis, A. H. A. Zili, A. Putri, dan A. Robiansyah, "Analisis Tren Minat Masyarakat Indonesia terhadap Artificial Intelligence dalam Menyongsong Society 5.0: Studi Menggunakan Google Trends," *G-Tech J. Teknol. Terap.*, vol. 7, no. 4, hal. 1345–1354, 2023, doi: 10.33379/gtech.v7i4.3091.
18. R. D. Rusnawati dan T. S. Hariyati, "Implementasi Internet Of Things Pada Layanan Kesehatan (Literature Review)," *J. Innov. Reseach Knowl.*, vol. 3471, no. 8, hal. 569–574, 2022.
19. A. Ansori, "Studi Pemanfaatan Internet of Things dan Data Mining untuk Pengawasan Bahan Bakar Minyak (Studi Kasus: Perusahaan Pelayaran Penumpang Nasional)," *Wave J. Ilm. Teknol. Marit.*, vol. 12, no. 1, hal. 31–42, 2018, doi: 10.29122/jurnalwave.v12i1.2915.
20. M. T. Syaeh, "Harmoni Hukum dan Bisnis : Antisipasi Tantangan Kepatuhan dan Inovasi Dalam Lingkungan Bisnis Merata-Tertata Berbasis E-commerce Tokopedia dalam Internet of Things (IoT) Melalui Gagasan 6 . 0," *Innov. J. Soc. Sci. Res.*, vol. 4, no. 1, hal. 957–970, 2023.
21. A. Taufik, "Sejarah Dan Pemanfaatan Iot Di Era Industri 4.0," *Portalddata.org*, vol. 2, no. 4, hal. 1–8, 2022.
22. widya watador, "perkembangan iot di Indonesia," 2022.
23. Yordan Rendis Suherman, Tangkas Ageng Nugroho, Fitra Barokah Quraini, dan Muhammad Yasin, "Analisis Perkembangan Industrialisasi Era 5.0 Terhadap Kondisi Pendidikan Di Kecamatan Menganti Kabupaten Gresik Jawa Timur," *J. Kaji. dan Penelit. Umum*, vol. 1, no. 3, hal. 169–182, 2023, doi: 10.47861/jkpu-nalanda.v1i3.241.

24. H. A. Mumtaha dan H. A. Khoiri, “Analisis Dampak Perkembangan Revolusi Industri 4.0 dan Society 5.0 Pada Perilaku Masyarakat Ekonomi (E-Commerce),” *J. PILAR Teknol. J. Ilm. Ilmu Ilmu Tek.*, vol. 4, no. 2, hal. 55–60, 2019, doi: 10.33319/piltek.v4i2.39.
25. Tangkas Ageng Nugroho, Achmad Kaisi Amaro, dan Muhammad Yasin, “Perkembangan Industri 5.0 Terhadap Perekonomian Indonesia,” *Manaj. Kreat. J.*, vol. 1, no. 3, hal. 95–106, 2023, doi: 10.55606/makreju.v1i3.1645.
26. A. Rizky Fadilla dan P. Ayu Wulandari, “Literature Review Analisis Data Kualitatif: Tahap Pengumpulan Data,” *Mitita J. Penelit.*, vol. 1, no. No 3, hal. 34–46, 2023.
27. A. A. Mekarisce, “Teknik Pemeriksaan Keabsahan Data pada Penelitian Kualitatif di Bidang Kesehatan Masyarakat,” *J. Ilm. Kesehat. Masy. Media Komun. Komunitas Kesehat. Masy.*, vol. 12, no. 3, hal. 145–151, 2020, doi: 10.52022/jikm.v12i3.102.
28. S. Hasibuan, I. Rodliyah, S. Z. Thalhah, P. W. Ratnaningsih, dan A. A. M. S. E, *Media penelitian kualitatif*, vol. 5, no. January. 2022. [Daring]. Tersedia pada: <http://belajarpsikologi.com/metode-penelitian-kualitatif/>
29. Ardiansyah, Risnita, dan M. S. Jailani, “Teknik Pengumpulan Data Dan Instrumen Penelitian Ilmiah Pendidikan Pada Pendekatan Kualitatif dan Kuantitatif,” *J. IHSAN J. Pendidik. Islam*, vol. 1, no. 2, hal. 1–9, 2023, doi: 10.61104/ihsan.v1i2.57.
30. M. N. Adlini, A. H. Dinda, S. Yulinda, O. Chotimah, dan S. J. Merliyana, “Metode Penelitian Kualitatif Studi Pustaka,” *Edumaspul J. Pendidik.*, vol. 6, no. 1, hal. 974–980, 2022, doi: 10.33487/edumaspul.v6i1.3394.
31. M. Waruwu, “Pendekatan Penelitian Pendidikan: Metode Penelitian Kualitatif, Metode Penelitian Kuantitatif dan Metode Penelitian Kombinasi (Mixed Method),” *J. Pendidik. Tambusai*, vol. 7, no. 1, hal. 2896–2910, 2023.
32. M. R, Y. Fahdillah, M. Kadar, I. Hassandi, dan M. R, “Implementasi Transformasi Digital dan Kecerdasan Buatan Sebagai Inovasi Untuk UMKM pada Era Revolusi Industri 4.0,” *J. Ilm. Manaj. dan Kewirausahaan*, vol. 3, no. 1, hal. 266–273, 2024, doi: 10.33998/jumanage.2024.3.1.1552.
33. R. Gustika, W. Firta, C. Suci Mantaup, M. Fahrozi, dan D. Kurnia Sandi, “Journal of Social and Economics Research,” *J. Sos. dan Ekon.*, vol. 3(2), no. 1, hal. 123–138, 2021.
34. Ekon.go.id, “Casual Talk FEKDI 2024: Diversifikasi, Kolaborasi, dan Inovasi Jadi Upaya Strategis Pengembangan Ekonomi Digital,” 2024.
35. A. Nurul Anisa dan E. Setyowati, “Analisis Peran Ekonomi Digital Terhadap Ketahanan Dan Pertumbuhan Ekonomi Di Indonesia,” *SEIKO J. Manag. Bus.*, vol. 6, no. 1, hal. 720–729, 2023.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

