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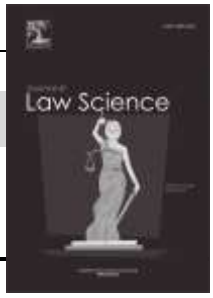

Implications of Artificial Intelligence (AI) on structural transformation and social control dynamics of society

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ABSTRACT

The development of Artificial Intelligence (AI) has significantly impacted structural transformation and the dynamics of social control within society. AI not only changes how individuals interact with the world but also influences various sectors such as the economy, education, and government. Large-scale automation and data processing enable greater efficiency but also present complex social challenges, including technological access inequality, job displacement, and ethical and privacy concerns. This study aimed to analyze the implications of artificial intelligence (AI) on the structural transformation and dynamics of social control in society. This article discusses how AI has become a catalyst for social change, affecting human interaction patterns, job structures, and the legal regulations needed to ensure that technological advancements align with principles of justice and inclusivity. A normative juridical approach is used to analyse the impact of AI on legal and social norms, as well as how regulations can address emerging challenges. The study's findings indicate that AI holds significant potential to improve human quality of life through efficiency and innovation but may also pose threats if not accompanied by appropriate regulations. Therefore, balanced policies are required to ensure that technological advancements are utilized while protecting human rights, allowing AI to contribute positively to social transformation. This study highlights the need for balanced and ethical regulation of AI. Practically, the findings help policymakers design fair rules to minimize the risks and maximize the benefits of AI for society.

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1. Introduction

Artificial Intelligence (AI) is a relatively new field of science, although its history dates back more than a century. One of the most famous works in the early history of AI is the science fiction Rossum's Universal Robots published in 1920 by Czech author Karel Čapek. The story tells of artificial humans referred to as 'robots.' Over time, various artificial intelligence methods

have evolved, ranging from fuzzy logic, expert systems, to statistical-based approaches such as Bayesian, Computer Vision, Robot Vision, and Deep Learning (Budiharto & Suhartono, 2014).

The development of AI as a scientific innovation began with the advent of modern computers in the mid-20th century, around the 1940s and 1950s. The ability of electronic machines to store and process information quickly allowed this technology to match the capacity of human thought. The main focus of computer science at that time was to design intelligent behavioural automation in computer systems, which could mimic some of the functions of the human brain such as language comprehension, knowledge, thinking, and problem solving (Ceruzzi, 1988).

In the 1950s, scientists began exploring the idea of how machines could mimic tasks typically performed by humans. Alan Turing, a British mathematician, came up with a concept known as the 'Turing Test' to measure the extent to which a machine could demonstrate intelligence (Sobron & Lubis, 2021). In this test, the machine attempts to impersonate a human by responding to a series of questions. Turing argued that if a machine could make a person believe that it was interacting with a human, then it could be considered intelligent.

In 1956, John McCarthy, a scientist from the Massachusetts Institute of Technology (MIT), introduced the term 'Artificial Intelligence' at the conference 'The Dartmouth Summer Research Project on Artificial Intelligence'. This conference became an important milestone in AI history, where AI founders and researchers from various institutions, including Carnegie Mellon University (CMU), gathered to explore the concept of AI. In this conference, AI was defined as the study of developing computers that are capable of performing intelligent tasks that previously could only be performed by humans (Chairani et al., 2022; Huang et al., 2019).

Broadly speaking, AI aims to use computers to simulate intelligent human behaviour and train computer systems to learn various aspects of human behaviour, such as learning, judgment, and decision-making. As technology evolves, AI capabilities are advancing and allowing these systems to perform increasingly complex tasks, with enormous potential to be applied in various areas of life.

The development of AI has brought great economic benefits to humans and all aspects of life, even pushing social development into a new era. AI is a compilation of computer science, logic, biology, psychology, philosophy, and many other disciplines, which results in various applications such as speech recognition, image processing, natural language processing, automated theorem proving, and intelligent robots. AI has an important role in social development providing revolutionary results to improve labour efficiency, reduce labour costs, optimise human resource structure, and create new job demands. Artificial Intelligence (AI) is the simulation of human intelligence modelled on machines and programmed to be human-like. Meanwhile, according to McLeod and Schell, artificial intelligence is the provision of computer-like machines that use the ability to exhibit behaviour that is claimed to be intelligent as if it were potentially displayed by humans (McLeod & Schell, 1989). In other words, AI is a computer system capable of doing work that would normally require human labour or human intelligence to complete (Bessie & Rudy, 2024).

AI itself is a generation that requires information to be used as knowledge like humans. AI is capable of self-correction or can correct itself manually. Synthetic Intelligence software in Chatbot technology aspires to create such Applications that are not only able to understand the meaning of the sentences spoken by the user, but can also provide appropriate and suitable responses in a short time. The synthetic intelligence of Chatbot includes the use of different types of social media that act as a platform on which the Chatbot will operate, there are many

systems that are usually used by chatbots such as LINE, Telegram and Facebook (Santoso et al., 2021).

Humans are creatures that are created apart from being individual creatures, socialising is a natural tendency that is in their souls, which is then a distinctive human trait. Individually, humans as creatures differentiate between one another, but become one unit when humans experience the process of socialisation with the wider community. As we know, that the social paradigm actually focuses on the area of action and interaction between individuals and other individuals, social behaviour in this case will always be the centre of standardisation of the extent of human behaviour in interaction. When an individual's behaviour is not in accordance with social norms, social interaction is hampered so that what is called a social problem arises.

In its understanding, the term social comes from the English word 'social' meaning 'society', while in terms of social : 1. of certain species of insect and animal species, including humankind. Living together in organised colonies or groups. 2. pertaining to. 3. concerned with being responsible for the mutual relations and welfare of individuals. For example social worker (Collins, 2006).

Humans as social creatures are often faced with the problems mentioned above. According to Philip Kotler, social problems are certain conditions in the social order that are considered not in accordance with the norms and disturb members of society, both individuals and groups, and can be reduced or eliminated through joint (collective) efforts. AI (Artificial Intelligence) technology or artificial intelligence is one of the fastest growing technologies in today's digital era. AI technology is a technology that is able to make machines or computers imitate human abilities in thinking, learning, and adapting. AI technology has been widely applied in various fields, such as education, health, economics, industry, agriculture, and military. However, AI technology also brings significant social changes to society. Social change is the process of change that occurs in the structure and function of society. Social change can be positive or negative, depending on the perspective and values adopted by the society (Hakim et al., 2023; Masithoh et al., 2023).

AI technology can improve effectiveness and efficiency in various fields, such as education, healthcare, economics, industry, agriculture, and the military. Examples are the use of robots to teach students in schools, the use of algorithms to diagnose diseases and prescribe drugs, the use of chatbots for customer service and online transactions, the use of automation to improve productivity and product quality, the use of drones to monitor crop conditions and pests, and the use of smart weapons to protect the country from threats.

AI technology can enhance human knowledge and creativity by providing broad and fast access to information (Gutierrez et al., 2021; Hydén, 2020). Examples are the use of search engines to find the information needed, the use of virtual assistants to help with work and daily activities, the use of recommendation systems to suggest products, services, or content that match user preferences, and the use of generative adversarial networks (GAN) to create unique and original works of art, music, or writing.

Although AI offers efficiency and innovation, challenges such as social inequality, increased surveillance, and ethical and legal impacts remain major issues (Vassel et al., 2024). In the context of social control, AI enables broader surveillance but risks reinforcing algorithmic discrimination and power imbalances (Bozdag, 2023; Saheb, 2023). The implementation of AI in urban governance, such as in China, reflects data-driven social control that can threaten social justice and democracy (Marvin et al., 2022).

In addition, AI affects structural transformation by reinforcing social stereotypes and ignoring diversity, particularly in education and media (Vassel et al., 2024). In addition, AI affects structural transformation by reinforcing social stereotypes and ignoring diversity, particularly in education and media (Al-Tkhayneh et al., 2023; Marvin et al., 2022). Unequal access to AI also deepens global inequality, exacerbating economic and social inequalities (Al-Tkhayneh et al., 2023; Saisubramanian et al., 2022).

With these implications in mind, this study seeks to explore how AI affects the dynamics of social control and structural transformation in society. This study is expected to provide insights into how AI can be managed more fairly and responsibly so that its benefits can be felt by all levels of society without exacerbating existing social inequalities. This research focuses on exploring the impact of AI on structural transformation and social control in society. In particular, it highlights how AI affects social control, resource distribution, and decision-making that can reinforce social biases and inequalities (Saheb, 2023; Vassel et al., 2024). In addition, this research examines the phenomenon of "AiSmosis," which is the process by which AI gradually changes patterns of social interaction and policy (Bozdag, 2023).

The main difference between this research and previous studies is the approach used. While previous studies focused more on the development of AI technology and its applications in various sectors such as health, economy, and education, this study focuses more on the social and ethical impacts of AI (Hakim et al., 2023; Marvin et al., 2022; Masithoh et al., 2023). In addition, this research considers how AI can strengthen social control by authorities and the implications for democracy and social justice. As such, this study offers a new perspective on the role of AI in social change and the challenges that arise in its implementation.

2. Method

This research uses a normative juridical method, which is research that focuses on legal norms contained in laws and regulations as well as legal concepts that develop in doctrine (Ali, 2014). Referring to Soekanto (2011), normative legal research is conducted by examining library materials or secondary data, which includes research on legal principles, legal systematics, vertical and horizontal legal synchronization, legal comparisons, and legal history. Thus, this research examines the effectiveness of regulations through a normative approach based on available legal materials.

The legal materials used in this research consist of primary legal materials, secondary legal materials, and tertiary legal materials. Primary legal materials include laws and regulations, court decisions, and other official documents that have binding force. Secondary legal materials are legal literature, scientific journals, and experts' opinions that support the analysis of primary legal materials. Meanwhile, tertiary legal materials are used as a complement to provide further understanding of relevant legal concepts (Nasution, 2008).

In ensuring the relevance and objectivity of the legal materials used, this research applies a systematic approach by analyzing legal synchronization horizontally (between norms at the same level) and vertically (between norms at different levels). In addition, a comparison of various legal sources was conducted to avoid bias in drawing conclusions (Soekanto, 2011). This approach aims to gain an in-depth understanding of the effectiveness of a regulation from a normative perspective without using empirical data.

This research bridges the gap between written legal norms and legal practice by evaluating the effectiveness of regulations through a normative approach, while considering criticism and the possibility of legal reform. This method can also be used to assess the relevance of regulations

in the face of social and technological change, by examining legal synchronization and comparison with other legal systems, thus opening up opportunities for legal improvement and reform.

3. Analysis and Results

Social change is a phenomenon of life experienced by every society anywhere and anytime. Every human society during its lifetime must experience changes in various aspects of its life, which occur in the midst of interactions (interactions) between individual members of society, as well as between society and its environment (Apdillah et al., 2022). If you compare your life today with that of a few years or decades ago, you must have noticed the changes. In the way you interact with each other on a daily basis, in the way you dress, in your family life, in your economic activities or livelihood, in your religious life, and so on. Everything that you feel is also felt by other people or communities. What is different is the speed or rate of change, as well as the scope (magnitude) of the change.

Traditional agrarian societies apply a subsistence economic system with simple tools, limited yields and no formal education. Farming activities are family-based, with roles divided by gender and age. Farming skills are passed down from generation to generation without formal education, so the education level of farming communities tends to be low. Besides farming, they also have other skills to fulfill their daily needs, such as home repair and health care, which makes them generalists with relatively low productivity (Kasnawi & Asang, 2014).

Traditional societies originally had close social relationships based on emotional values, with spontaneous social control through gossip or rumors. The leadership system was based on seniority or hereditary status, maintaining harmony in social life. However, changes occurred due to internal and external factors. Farmers began to use modern technology, increasing production and economic efficiency. This led to occupational specialization, where family members were no longer directly involved in farming, but had other activities. With increased education and commercial orientation, social relations became more rational, replacing emotional relations. Social control weakened, and attention to social issues diminished. Democratization of leadership also occurred as family ties weakened and people's education levels increased.

Leaders who are appointed are no longer based on their seniority or hereditary background but are more determined by their education or ability. There are often problems between community members that can no longer be resolved by family deliberation among community members, forced to be resolved through special institutions such as the courts. the social changes experienced by the peasant community exemplified above, will continue to follow the development of the life of the community concerned (Kristian, 2023). There are societies that are relatively very slow to experience social change, for example, until decades of new changes occur, so that at first glance from the outside it is not clear that there is social change. However, there are also societies that are relatively fast or very fast experiencing social change, so that it is felt to be a very dynamic society (Wiyanto, 2022).

How slowly or quickly social change occurs in a particular society will depend on the extent to which the elements within the society are open to change. The elements referred to here mainly concern the way of thinking, the way of behaving, and the way of acting (culture) of the community members themselves. This is generally influenced by contact with other societies that allow encounters between cultures (acculturation), where there are also developments in the fields of science and technology (Tahir, 2018). Regarding the factors that influence the field

of science and technology and the factors that influence the occurrence of social change will be discussed in more depth in other sections. Similarly, in groups of people who experience social change that covers all or almost all aspects of their lives, so that it will show very fundamental or comprehensive changes, namely changes in the social system of the community itself. Such social changes, in foreign languages, are referred to in the term change of social system or social system change. In this kind of society, there have been changes in the aspects of material culture such as forms of clothing, housing, etc., as well as normative aspects such as how to get along between members of the community, between men and women, between family members, etc., even changing the values system. The community can be said to have undergone total social change. But on the other hand, there are also groups of people who only experience social change in some aspects of society and some others are still maintained.

For example, only aspects of material culture such as how to dress or normative aspects such as how to socialise change, while the value system is still maintained (Hendriani & Nulhaqim, 2008). These differences in the scope of this aspect of social change are also greatly influenced by the level of openness and the level of socio-economic and cultural development of the society concerned. Regarding the size of the scope of social change and the factors that influence it, it will also be further elaborated at the end of this module. From the descriptions above, we can understand that the concept of social change is actually inseparable from cultural change. Society represents a group of people united by shared culture, while culture itself encompasses the collective ways of feeling, thinking, and acting (patterns of mind, taste, and will) of its members (Kusairi, 2022). The patterns of mind, taste and spirit of the citizens of the community, known as the concept of culture, develop in line with the development of surrounding factors. Thus, there is continuous cultural change. This change in culture manifests itself in changes in various observable aspects of community life as mentioned earlier, namely in aspects of material life, norms and rules of society, and value systems. This comprehensive transformation is what we understand as social change (Kasnawi & Asang, 2014).

The current Industrial Revolution 5.0 encourages human productivity to be dependent on technology (Apdillah et al., 2022). Technology that has been integrated with human expertise requires people to be more adaptive and responsive to change. The impact of these changes can be seen with the use of various advanced technologies in facilitating human work such as Robots, Internet of Things (IoT), and Artificial Intelligence (AI). Artificial Intelligence (AI) is the oldest and broadest field of computer science related to all aspects that mimic cognitive functions in problem solving and build human-like learning and thinking systems. Artificial Intelligence is rapidly being adopted in many industries to improve performance, precision, time efficiency and reduce costs.

The term Artificial Intelligence was coined by John McCarthy at the Dartmouth Conference in the mid-20th century and is an experimental branch of computer science with the aim of creating intelligent machines that can perform various tasks through their intelligence. This development has led some to claim that humans are entering the fifth industrial revolution where technology is blurring the lines between the physical, digital and biological spheres. One example of technology that uses artificial intelligence is the use of ChatGPT to find out and do things. However, ChatGPT would not be able to function optimally without the support of human intelligence in giving the right commands. Another example is the use of HRIS software with cloud technology. This technology can streamline the work of Human Resources (HR) and even in certain features orientated towards employee welfare with human assistance (Disemadi, 2021).

The integration of artificial intelligence (AI) in the agricultural sector continues to grow as the need for productivity and sustainability increases to meet global food demand. Countries such as the United States, China, and India are leading the adoption of AI in this field, supported by extensive research and implementation of the technology (Bhagat et al., 2022; Oliveira & Silva, 2023). Meanwhile, North America and Europe show the highest level of AI integration, while Asia and Africa are increasingly adopting the technology to address the challenges of food security and labor constraints (Lakshmi & Corbett, 2020; Vadlamudi, 2019).

The AI market in agriculture is projected to experience significant growth with a compound annual growth rate (CAGR) of 24.5%. In 2022, this market generated revenue of USD 1.2 billion and is expected to increase to USD 10.2 billion by 2032 (GLOBE NEWSWIRE, 2024). This growth is driven by large investments in smart agriculture, which increased from USD 1.1 billion in 2017 to USD 4.9 billion in 2021. In addition, the digital agriculture sector is also growing rapidly, such as the e-commerce market for agricultural products, which is projected to reach USD 90.1 billion by 2033. This increase shows that AI has a strategic role in the optimization of modern agriculture, whether through software (45.2% market share), hardware (24.5%), or AI-based services (18.0%) (GLOBE NEWSWIRE, 2024). With these innovations, AI is expected to improve the efficiency of global agriculture and address future sustainability challenges.

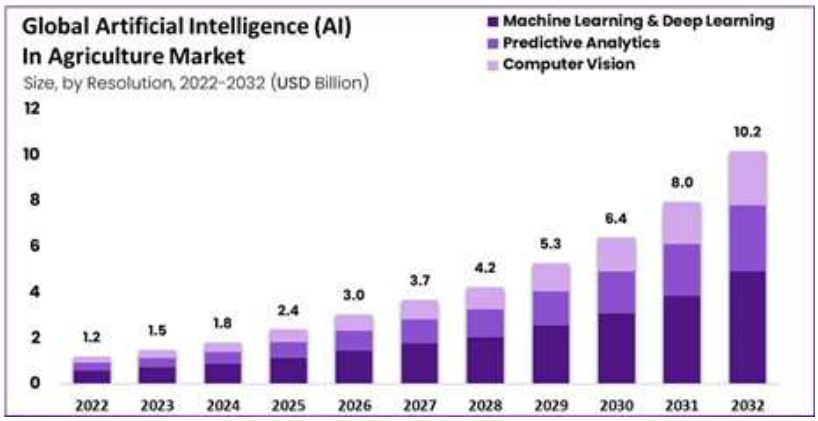

Figure 1. Global Artificial Intelligence (AI) in Agriculture Market
Source : GLOBE NEWSWIRE (2024)

The development of technology, including artificial intelligence (AI), cannot be limited but can be controlled through regulations that ensure its use remains balanced and beneficial. Governments have a role to play in regulating the implementation of AI so that it continues to support human roles, while families also have a responsibility in supervising children's use of the internet to ensure positive impacts. Concerns about AI are mainly related to the potential replacement of human jobs in various sectors, such as manufacturing, agriculture, and public services. While AI improves efficiency and reduces human error, its impact on the labor market, including the potential for increased unemployment, is a major issue. On the other hand, many are in favor of AI as the technology also brings benefits in making work easier and increasing productivity. Therefore, collaboration between government regulations, industry, and society is important to ensure that AI development provides balanced benefits without compromising social and economic stability.

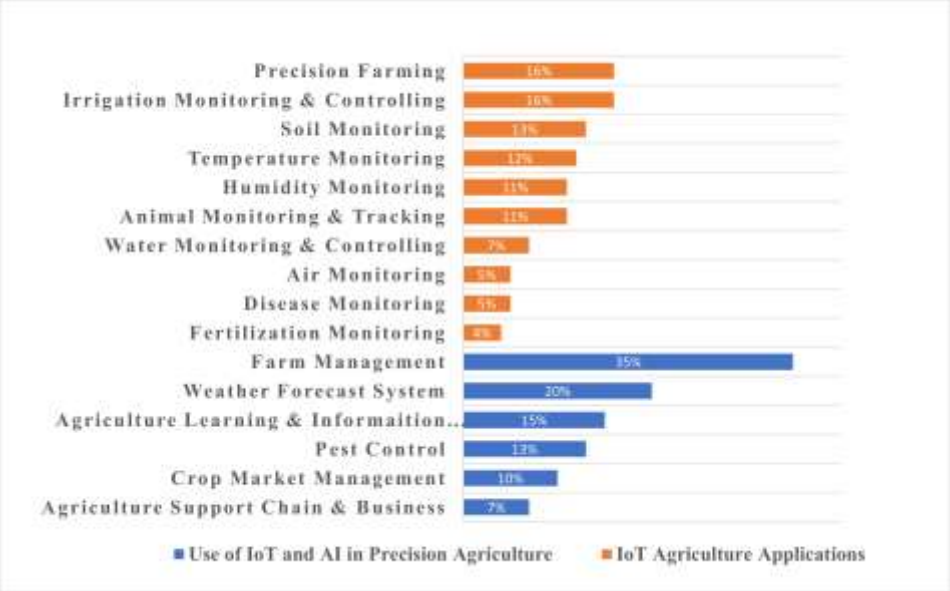

Figure 2. Use of IoT, AI in Precision Agriculture, and IoT Agriculture Applications
Source : Market.Us

The use of IoT and AI in precision agriculture has brought significant changes to various aspects of farming activities. Farm management is the sector with the highest utilization, reaching 35%, highlighting the role of technology in improving operational efficiency and productivity. Weather forecasting systems rank second at 20%, enabling farmers to make more informed decisions based on real-time weather data. Meanwhile, agricultural learning and information systems, accounting for 15%, contribute to enhancing knowledge and better farming practices. Pest control, at 13%, leverages IoT and AI for more effective monitoring and prevention. Crop market management, at 10%, assists farmers in analyzing markets and developing better marketing strategies.

IoT applications in agriculture encompass various functions aimed at improving the effectiveness of farming practices. Precision farming and irrigation monitoring and control each account for 16%, emphasizing the importance of precise resource management in agriculture. Soil monitoring stands at 13%, ensuring optimal soil conditions for plant growth. Temperature and humidity monitoring, at 12% and 11% respectively, contribute to climate control and plant health. Livestock monitoring and tracking, also at 11%, aid in livestock management and welfare. Water control and monitoring, at 7%, ensure more efficient water resource usage. Meanwhile, air and disease monitoring, at 5% each, play a role in addressing environmental and health factors in agriculture. The integration of these technologies highlights the crucial role of IoT and AI in shaping a smarter and more sustainable future for agriculture.

Artificial Intelligence (AI) has great potential to support human work with its ability to quickly analyze data, identify complex patterns, and provide valuable information for decision-making. In healthcare, education, and finance, AI has improved the efficiency and accuracy of diagnosis, provided better recommendations, and detected potential security threats and fraud. AI has also made it easier for various professions, such as online sellers who are helped by automated chatbots, journalists who use word processing applications to speed up news production, and lawyers who utilize AI in collecting legal data.

In addition, AI has changed the paradigm of work, particularly in marketing, where it enables companies to understand customer preferences more accurately to devise effective marketing strategies. AI also plays a role in enhancing creativity and innovation by providing inspiration based on extensive data analysis. With the automation of routine tasks, human workers can focus more on work that requires complex problem solving, creativity, and social interaction, thereby improving worker satisfaction and quality of life.

While AI can simplify and replace some human tasks, humans are still needed to optimize this technology. AI cannot work independently without human direction, such as in content production or legal consulting which still require critical thinking, analysis, and context provided by humans. Therefore, jobs that require high analysis will not be completely replaced by AI, but will be optimized and simplified through the integration of these technologies. Adaptation to change and innovation is the key for AI to provide maximum benefits without threatening the existence of humans in the workforce, as happened in the Industrial Revolution.

From a philosophical perspective, AI is in the intermediate domain as proposed by Heinrich Rickert, which is between formal science, natural empirical science, and cultural empirical science. Thus, AI is not only a product of natural science or mathematics, but also has social and cultural dimensions. This has an impact on the methods and objects of application of AI, where social and cultural science approaches can expand the scope and methodology of AI in understanding social phenomena. AI also has the potential to be part of cultural evolution in this information age, although to date the role of AI in cultural development has been limited (Pabubung, 2021).

4. Conclusion

The impact of artificial intelligence (AI) on social transformation and societal control is complex and multidimensional. AI has streamlined many aspects of life by enhancing efficiency and innovation, particularly in the economic, educational, and public service sectors. However, these advancements also present challenges, such as job displacement due to automation, widening social and digital inequality, and the potential misuse of personal data. In the long run, AI may reshape social structures by altering work patterns, redefining human interactions, and influencing power dynamics between individuals, corporations, and governments.

In the context of law and policy, clear regulations are essential to ensure AI development aligns with human values and social justice. Without adequate regulation, AI has the potential to become a tool of control that threatens individual freedoms. Therefore, governments must implement proactive policies, including ethical guidelines for AI development, data protection laws, and workforce transition programs to mitigate job losses. Industries should focus on responsible AI innovation, transparency in algorithmic decision-making, and equitable access to AI-driven opportunities. Meanwhile, individuals must enhance digital literacy and acquire new skills to adapt to changes in the job market. Although AI may replace certain jobs, human-technology collaboration remains crucial. AI should be seen as a tool for enhancing productivity rather than a threat. Society must adapt through lifelong learning and digital inclusion to prevent social inequality. With the right strategies, AI can become a force for positive transformation across all levels of society.

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