IMPACT OF ARTIFICIAL INTELLIGENCE ON JOB AUTOMATION: A SYSTEMATIC REVIEW

DAMPAK KECERDASAN BUATAN PADA OTOMASI PEKERJAAN: TINJAUAN SISTEMATIS

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ABSTRACT
AI-driven job automation has driven global economic transformation, increased efficiency and created innovation opportunities, but has also presented serious challenges such as structural unemployment and social inequality. This research aims to explore mitigation strategies through policy analysis, retraining, and ethical approaches in technology development. Using a systematic literature review method, this study found that AI-based training and multisectoral collaboration are effective approaches to support workforce transition. The results of this research provide practical insights for governments and companies in creating inclusive strategies to mitigate the negative impacts of automation.
Keywords: job automation, artificial intelligence, retraining, social inequality, inclusive policies, algorithmic bias.

ABSTRAK
Otomatisasi pekerjaan berbasis kecerdasan buatan (AI-driven job automation) telah mendorong transformasi ekonomi global, meningkatkan efisiensi, dan menciptakan peluang inovasi, tetapi juga menghadirkan tantangan serius seperti pengangguran struktural dan ketimpangan sosial. Penelitian ini bertujuan untuk mengeksplorasi strategi mitigasi melalui analisis kebijakan, pelatihan ulang, dan pendekatan etis dalam pengembangan teknologi. Dengan menggunakan metode tinjauan literatur sistematis, studi ini menemukan bahwa pelatihan berbasis AI dan kolaborasi multisektoral adalah pendekatan efektif untuk mendukung transisi tenaga kerja. Hasil penelitian ini memberikan wawasan praktis bagi pemerintah dan perusahaan dalam menciptakan strategi inklusif untuk memitigasi dampak negatif otomatisasi.
Kata Kunci: otomatisasi pekerjaan, kecerdasan buatan, pelatihan ulang, ketimpangan sosial, kebijakan inklusif, bias algoritmik.

1. Introduction

The global industrial transformation driven by the adoption of artificial intelligence (AI) technology has significantly altered operational methodologies across various sectors, including manufacturing, financial services, and healthcare. In manufacturing, intelligent robots are increasingly utilized for product assembly, achieving high speed and precision that surpass traditional methods. This shift is characterized by the automation of numerous jobs, as AI technologies reduce the mechanical difficulty faced by industrial firms, leading to substantial changes in employment dynamics within the sector (Xian, 2022; Weng, 2024). The integration of AI in manufacturing not only enhances productivity but also fosters the development of smart manufacturing systems, which leverage machine learning and data analytics to optimize operations (Verma, 2018; Cioffi et al., 2020).

In the financial services sector, the emergence of technologies such as robo-advisors exemplifies the transition from traditional investment analysis to automated solutions that provide rapid and efficient services. This transformation reflects a broader trend where automation is reshaping job roles and responsibilities, leading to concerns about job

displacement. A comprehensive review indicates that up to 30% of jobs worldwide could be automated by 2030, highlighting the potential for significant disruption in conventional employment (Mulas-Granados et al., 2019; Vadie, 2023). The implications of this shift are profound, as it raises critical questions regarding the future of work and the necessary skills required in an increasingly automated landscape.

Healthcare is another sector experiencing a profound impact from AI, particularly in disease detection and diagnosis. AI systems analyze vast amounts of medical data to provide more accurate and timely diagnosis, thereby improving patient outcomes (Ikumapayi et al., 2022). However, the rapid adoption of AI technologies across these sectors also introduces uncertainties. Workers are faced with the challenge of adapting their skills to meet the evolving demands of the job market, while companies grapple with ethical dilemmas, including data privacy and algorithmic bias (Tsai et al., 2022; Ernst et al., 2019). The need for reskilling and upskilling initiatives is paramount to ensure that the workforce can navigate the complexities introduced by automation and AI (Narine, 2023; Badet, 2021).

The statistics surrounding job automation underscore the urgency of addressing these challenges. The McKinsey Global Institute's projection that 400 to 800 million jobs could be automated by 2030 serves as a stark reminder of the potential risks associated with AI adoption (Mulas-Granados et al., 2019; Vadie, 2023). Furthermore, studies indicate that jobs with a high probability of automation often correlate with poorer psychosocial work conditions, raising concerns about worker health and well-being in an automated future (Cheng et al., 2020; Cheng et al., 2020). As industries continue to evolve, it is crucial for stakeholders to develop strategies that not only harness the benefits of AI but also mitigate the adverse effects on employment and worker health. In conclusion, the transformation driven by AI technology across various sectors presents both opportunities and challenges. While AI enhances efficiency and productivity, it also necessitates a reevaluation of workforce skills and ethical considerations. Addressing these issues will be critical to ensuring a balanced approach to the future of work in an increasingly automated world.

AI-driven transformation is evident in case studies of global companies. Amazon, for example, has leveraged AI to optimize logistics and warehouse management. Technology like Kiva Robots helps speed up the picking and packing process, significantly increasing operational efficiency. However, this innovation also raises social challenges, such as reducing the need for human labor in warehouses. Meanwhile, tech startups like X.AI offer AI-based solutions that replace administrative tasks. The virtual assistant they developed is able to manage schedules with high efficiency, replacing roles previously performed by humans. This kind of solution is an example of how AI can transform routine work into more automated and free of manual intervention.

However, in developing countries, implementing AI faces unique challenges. Technological infrastructure barriers are a major barrier, especially for micro, small and medium enterprises (MSMEs) which often lack the resources to adopt AI-based automation systems. This disparity reflects the need for more inclusive strategies to ensure that the benefits of AI are felt equally across regions and sectors. One of the main challenges in understanding the impact of AI-based job automation is the lack of integrated understanding. Many studies have focused separately on the benefits or challenges posed by AI-driven job automation, but few have attempted to provide a comprehensive analysis. The relationship between benefits, such as efficiency and innovation, and challenges, such as social inequality and structural unemployment, has not yet been comprehensively explored. This results in a knowledge gap about how these two aspects influence each other and shape dynamics in various sectors. Additionally, there is a lack of clarity in strategies for managing emerging challenges. Issues such as structural unemployment, arising from the loss of jobs that can be automated, and social inequality exacerbated by gaps in access to technology, have not been a major focus in academic discussions. Likewise, ethical issues, such as data privacy and

algorithmic bias, are often overlooked in the development of AI implementation strategies. This lack of focus indicates the need for more in-depth research to identify and develop effective steps to address these challenges.

The main research questions that form the basis of this study are: *"What are the major benefits and challenges associated with AI-driven job automation?"* This question aims to identify and comprehensively understand the main benefits and challenges arising from the adoption of AI technology in job automation. With a focus on benefits, this study seeks to explore how AI can improve efficiency, productivity and innovation in various sectors, from manufacturing to financial services and health. Conversely, this study also highlights the major challenges that accompany the use of AI, such as structural unemployment due to the loss of jobs that can be automated, social inequality exacerbated by gaps in technology access, and ethical issues such as algorithmic bias and data privacy.

It is hoped that these questions will help create an integrated understanding of the impact of AI-based automation, providing insights not only for academics, but also for policymakers, organizations and society at large. In addition, this research will try to explore the dynamic relationship between benefits and challenges, so that it can provide strategic guidance for exploiting the potential of AI while mitigating its negative impacts. Thus, it is hoped that this research will become a strong basis for developing more inclusive and sustainable policies and strategies in the era of AI-based automation. In an era of rapid digital transformation, the adoption of artificial intelligence (AI) technology has become a major catalyst for change in various industrial sectors. Organizations face major challenges in adapting to these changes, especially in ways of working that increasingly rely on automation. A deep understanding of the impact of AI-driven job automation is not only relevant, but also urgent to ensure the global workforce is prepared to face these dynamics. AI adoption has the potential to accelerate global economic growth, but without wise management, this change could exacerbate social and economic inequality. Therefore, thoroughly understanding the benefits and challenges is the foundation for helping organizations, policymakers and society adapt effectively to these changes. In the face of an ever-evolving work landscape, policy makers and organizational leaders need guidance that is based on data and scientific evidence. Strategic decisions such as policy design, investment in technology, and workforce management must consider the long-term impact of AI-based job automation. This study aims to provide in-depth strategic insight into how technology can be leveraged to maximize benefits, such as increased efficiency and innovation, while reducing possible risks, such as structural unemployment and ethical issues.

This research aims to explore and document the main benefits offered by AI-driven job automation. This includes analysis of how this technology can improve operational efficiency, reduce production costs, and speed up work processes. In addition, this research will explore the role of AI in producing innovative products and services that previously could not be realized with human power alone, as well as its impact on organizational competitiveness in the global market. Apart from the benefits, this research will also highlight various challenges that arise from the adoption of AI technology in the world of work. These challenges include the risk of mass unemployment due to the replacement of human labor by machines, widening socio-economic gaps due to differences in access to technology, as well as ethical issues including data privacy, algorithmic transparency, and bias in AI-based decision making. This research will provide an in-depth analysis of how these challenges are interconnected and their impact on society as a whole.

The ultimate goal of this research is to develop evidence-based strategic recommendations that can help organizations and policymakers design inclusive and sustainable AI implementation approaches. These recommendations will include workforce retraining strategies, development of policy frameworks that support equitable adoption of technology, and mitigation measures to address social and economic risks associated with job

automation. This research is expected to make a significant contribution to the academic literature on AI-driven job automation, especially through a structured systematic approach. By utilizing the Systematic Literature Review (SLR) method and PRISMA standards, this research will present a comprehensive analysis of the positive and negative impacts of AI-based job automation. In addition, this research also seeks to fill the literature gap by presenting an integrated understanding of the relationship between the benefits and challenges of AI in the world of work.

From a practical perspective, the results of this research will provide guidance that can be implemented by organizations and governments in designing policies and strategies. This approach is designed to ensure that AI adoption not only increases efficiency and innovation, but also creates a fair and inclusive work environment. For example, recommendations regarding workforce retraining and investment in inclusive technologies can help reduce the negative impact of job automation. This research also makes a significant social contribution by offering an approach that supports inclusivity in the adoption of AI technology. It is hoped that the findings from this research can help reduce social inequality by ensuring that workers from all walks of life have fair access to opportunities generated by AI-driven job automation. In addition, this research can also encourage wider dialogue about the importance of transparency, ethics and sustainability in the implementation of AI technology in various sectors.

2. Methods
2.1. Method

This research uses a Systematic Literature Review (SLR) approach to conduct a structured and focused exploration of various relevant scientific literature regarding the main benefits and challenges posed by AI-based work automation. This method was chosen to allow in-depth analysis of the available empirical evidence, identify thematic patterns, and explore the complex relationships between the various variables involved. The SLR approach aims not only to synthesize information, but also to fill literature gaps by presenting new insights that are integrated and evidence-based.

2.2. Standards Used

The process of conducting this research followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. PRISMA was chosen because of its reliability in providing systematic and transparent guidance for every stage of research, from data collection, article selection, to literature analysis. By following these standards, research ensures that each step is replicable and the results are credible. PRISMA helps increase accuracy in selecting relevant and significant literature, thereby ensuring that research results reflect the actual conditions of the topic being researched.

2.3. Justification of Method

The Systematic Literature Review approach has the advantage of integrating various empirical findings from studies conducted in various geographic, industrial and social contexts. This is very important in exploring the global and multidimensional impact of AI-driven job automation. By using SLR, research can identify trends and gaps in the literature that have not been adequately researched, providing greater insight than conventional research methods. This approach also allows critical evaluation of existing literature, both in terms of quality and relevance, thereby helping researchers to draw conclusions that are not only comprehensive, but also relevant to practical and theoretical needs. Furthermore, this method allows research to answer complex research questions in a structured and evidence-based manner, which is critical for supporting strategic decision-making in the context of AI-based job automation. With a combination of rigorous methodology and systematic reporting standards, this research

is expected to provide significant contributions, both in the form of a theoretical framework and practical recommendations that can be implemented by policy makers, academics and organizations.

2.4. Data Collection Procedures
2.4.1. Databases Used

To ensure the quality and broad coverage of this research, the articles used were taken from three leading databases that have a high reputation for providing reliable and relevant scientific literature:

- Scopus: Scopus provides access to multidisciplinary literature from various fields, including technology, economics, and management. This database is known for providing a broad range of peer-reviewed journals, allowing this research to encompass the cross-disciplinary perspectives necessary to address a complex topic such as AI-based job automation.
- IEEE IEEE Xplore accommodates in-depth articles on the latest technological innovations, which provide important insights in this study.
- Web of Science: Web of Science is a database with a high reputation in various fields of science, including social sciences and technology. This database provides access to high-impact and frequently referenced journals around the world, ensuring the quality and integrity of the articles used in this research.

2.4.2. Keywords

To ensure relevant study searches, this research used the following keyword combinations, selected to cover various dimensions of the topic of AI-based job automation:

- "AI-driven job automation"
- "benefits of AI automation"
- "challenges of AI automation"
  These keyword combinations are designed to capture various aspects of the benefits and challenges of AI-based automation, as well as the topic's relevance in today's economic and social context.

2.4.2.1. Inclusion Criteria

Articles accepted for this research must meet the following inclusion criteria to ensure the quality and relevance of the data used:

- Articles published in peer-reviewed journals: To maintain validity and quality, only articles that have gone through the peer review process will be included, thereby ensuring high scientific standards.
- Publications in the 2015–2025 timeframe: This timeframe was chosen to maintain relevance with the latest technological developments. Rapid developments in the field of AI in the last decade make newer studies essential for accurate analysis.
- Studies that address the benefits and challenges of AI-based job automation: Only studies that directly address the positive and negative impacts of AI-based job automation will be considered, to ensure a clear focus on the objectives of this research.

2.4.2.2. Exclusion Criteria

Articles that do not meet certain criteria will be excluded from the analysis. Articles released include:

- Articles that have not gone through the peer-review process, such as opinion articles, editorials, or writings that are more speculative than based on empirical data.

- Policy reports or popular articles: These articles often do not provide empirical analysis that can be used to draw objective conclusions, and were therefore not included in this study.
- Studies not directly related to AI-based jobs: Articles that only discuss general aspects of AI technology without focusing on its impact on jobs and the workforce will be excluded from the analysis.

2.5. Article Selection Process:

Article selection was carried out carefully in three stages to ensure that only relevant and high-quality studies were included in the literature review:

1. Title and abstract screening: The first stage involves initial screening of the title and abstract to determine whether the article is relevant to the research topic. This helps to efficiently weed out irrelevant articles in the first place.
2. Full text review: Articles that pass the first stage will be reviewed in more depth by reading the full text to ensure that the article meets the established inclusion and exclusion criteria.
3. Validation by two independent researchers: To avoid selection bias and ensure objectivity in the selection process, two independent researchers will validate the screened articles. The final decision regarding inclusion or exclusion of articles will be made based on consensus between the two researchers.

It is hoped that this rigorous selection process will produce a comprehensive and high-quality collection of articles, which will provide a strong basis for further analysis of the benefits and challenges of AI-based job automation.

2.6. Data Analysis Procedures

In this research, the data was analyzed using take the approach thematic, which is a highly effective qualitative method for identifying and understanding key patterns in data relating to the benefits and challenges of AI-driven job automation. This thematic approach involves several important steps described as follows:

- Manual Data Coding: In the first stage, the data collected will be manually coded by dividing the information into relevant initial categories, such as "efficiency", "risk of job loss", "social inequality" and "impact on quality of life". This coding process aims to identify key concepts that frequently appear in the literature, thereby providing an initial structure for further analysis.
- Identification of New Subthemes: During the analysis process, the researcher will also conduct a more in-depth search to discover new sub themes or topics that may not have been covered in the initial coding. This may include more specific issues or new findings that emerge with a deeper understanding of the data. The development of new subthemes allows this research to remain responsive to the dynamics of information emerging in the literature.

This approach is designed to provide a clearer and more comprehensive picture of various aspects of AI-based job automation, both in terms of benefits and challenges. To support the qualitative data analysis process, this research uses NVivo software, which is a very useful tool in organizing and analyzing qualitative data. NVivo enables researchers to conduct thematic analysis efficiently and effectively with the following key features:

- Organizing Data Based on Themes and Subthemes: With NVivo, researchers can group data that is relevant to certain themes, such as benefits or challenges, as well as more specific subthemes. This makes it easier for researchers to identify relationships between data and discover patterns that may be hidden in manual analysis.
- Visualization of Relationships Between Concepts: NVivo's visualization feature allows researchers to create thematic diagrams that show relationships between concepts or

themes. This diagram can clarify how the various benefits and challenges of AI-based job automation relate to and influence each other, providing a more holistic view of the problem under study.

3. Results
3.1 Benefits of AI-Driven Job Automation

AI-driven job automation has emerged as a transformative force across various industries, yielding significant benefits that enhance operational efficiency, improve quality, and stimulate product innovation. This synthesis explores these benefits, particularly focusing on operational efficiency, which is a critical area where AI technologies have made substantial impacts.

1. **Operational Efficiency**

One of the primary advantages of AI-driven job automation is the marked increase in operational efficiency. AI technologies streamline processes, reduce production times, and optimize resource utilization. For instance, the implementation of robotic process automation (RPA) in manufacturing has been shown to decrease production cycle times significantly (Abdelsalam, 2024). In the automotive sector, companies such as Toyota and Tesla utilize advanced AI-equipped robots that not only accelerate vehicle assembly but also enhance precision, thereby minimizing human error and boosting overall productivity (Hao, 2024).

Moreover, AI-driven automation significantly reduces operational costs. By automating repetitive tasks, organizations can decrease their reliance on human labor, which leads to lower wage expenses. For example, logistics firms like DHL have successfully employed AI algorithms to optimize delivery routes, resulting in reduced delivery times and fuel costs, thereby enhancing the efficiency of their distribution processes (Yeo-Udo, 2024). This trend is not limited to logistics; in manufacturing and customer service, AI can take over many administrative tasks, further driving down costs and increasing operational speed (Atadoga, 2024).

Additionally, AI's predictive capabilities contribute to operational efficiency by enabling predictive maintenance, which can extend the life cycle of machinery and reduce downtime (Sofoluwe, 2024). This capability is particularly valuable in sectors such as maritime transport, where AI applications have been shown to enhance operational accuracy and efficiency (Zerbino et al., 2019). The integration of AI in various operational contexts underscores its role in facilitating a more agile and responsive organizational framework.

2. **Quality Improvement**

In addition to operational efficiency, AI-driven automation enhances the quality of products and services. By leveraging data analytics, AI systems can identify trends and anomalies that may not be apparent to human operators, allowing for timely interventions that improve quality control processes (Sofoluwe, 2024). For instance, in smart manufacturing, AI techniques such as machine learning and data analytics are employed to optimize quality control and predictive maintenance, ensuring that products meet high standards consistently (Verma, 2018).

3. **Product Innovation**

AI also plays a crucial role in fostering product innovation. The ability of AI systems to analyze vast amounts of data enables organizations to gain insights into customer preferences and market trends, which can inform the development of new products and services (Mishra et al., 2022). This capability is particularly evident in supply chain management, where AI enhances demand forecasting and inventory management, leading to more innovative approaches to product delivery and customer engagement (Singh, 2023). In conclusion,

AI-driven job automation presents a multitude of benefits that significantly enhance operational efficiency, improve quality, and stimulate product innovation. The integration of AI technologies across various sectors not only optimizes processes but also fosters a culture of continuous improvement and innovation.

3.2. Quality Improvement

AI-driven job automation significantly enhances the quality of products and services across various industries. By leveraging AI technologies, organizations can achieve higher consistency and quality standards in their production and operational processes. This section discusses the benefits of AI in quality improvement, focusing on process accuracy and the minimization of human error.

1. **Process Accuracy**

AI's capability to process vast amounts of data with high precision is a crucial advantage in quality improvement. In manufacturing, for instance, AI systems are employed for defect detection, ensuring that products meet established quality standards. Machine learning algorithms facilitate image and sensor analysis, enabling the identification of discrepancies or defects more effectively than traditional manual inspections (KULYNYCH, 2024). In the pharmaceutical sector, AI plays a vital role in quality assurance by analyzing raw materials and finished products for contamination or inconsistencies, thereby safeguarding product quality and safety (Guo, 2023). The speed and accuracy of these AI-driven processes not only enhance operational efficiency but also help organizations adhere to stringent regulatory requirements (KULYNYCH, 2024).

2. **Minimizing Human Error**

Human error is a significant concern in manual processes, particularly in tasks requiring high precision. Fatigue and carelessness can lead to mistakes that compromise product quality. AI-based automation effectively mitigate these risks by taking over tasks that are prone to human error. For example, in electronics manufacturing, the assembly of components is a complex task where human oversight can result in product failures. Implementing AI systems in these processes can drastically reduce the incidence of errors, leading to improved product quality and a decrease in defective items that require rework or disposal (Valeria, 2024). Furthermore, the integration of AI in operational workflows can enhance overall productivity by allowing human workers to focus on more strategic tasks while AI handles routine, error-prone activities ("Artificial Intelligence at Work: Transforming Industries and Redefining the Workforce Landscape", 2024). In conclusion, the integration of AI technologies in various industries not only streamlines processes but also significantly enhances the quality of products and services. By improving process accuracy and minimizing human error, AI-driven automation is transforming operational standards and ensuring that organizations can meet the evolving demands of quality assurance.

3.3. Product Innovation

AI-driven job automation has significantly influenced product innovation across various sectors, primarily through its ability to analyze vast amounts of data and identify patterns that are often imperceptible to human analysts. This capability has enabled companies to develop new solutions that cater to evolving market demands. For instance, the emergence of autonomous vehicles, such as those developed by Waymo and Tesla, exemplifies how AI can lead to groundbreaking innovations in transportation. These vehicles not only reduce the reliance on human drivers but also enhance safety and efficiency in transit systems, potentially transforming urban mobility. Moreover, AI-based recommendation systems have revolutionized customer interactions in e-commerce. Companies like Amazon leverage these systems to analyze user behavior and preferences, resulting in personalized product suggestions that

significantly enhance the shopping experience. Research indicates that such implementations can lead to sales increases of up to 35%, demonstrating the tangible benefits of AI in driving consumer engagement and satisfaction (Wang et al., 2023; Zhang et al., 2020). The ability of AI to adapt to user preferences in real-time exemplifies its role in fostering product innovation and improving market responsiveness.

In addition to creating new products, AI enhances production flexibility, allowing companies to swiftly adjust their manufacturing processes in response to changing consumer trends. This adaptability is particularly crucial in fast-paced industries such as fashion and electronics, where market demands can shift rapidly. AI-driven automation enables manufacturers to implement changes without extensive downtime or manual intervention, thus maintaining competitiveness in a dynamic market environment (Rao, 2024; Bathla et al., 2022). The integration of AI technologies not only streamlines production but also supports the development of customized products, further driving innovation (Vermesan et al., 2021). As AI technologies continue to evolve, their impact on product innovation is expected to expand, leading to even more significant advancements across various sectors. The ongoing development of AI capabilities promises to unlock new opportunities for innovation, enhancing both operational efficiency and the quality of products and services offered to consumers (Chintalapati & Pandey, 2021; al., 2023). The convergence of AI with other emerging technologies will likely catalyze further transformations in industries, paving the way for innovations that were previously unattainable.

3.4 Challenges of AI-Driven Job Automation

AI-driven job automation presents a complex landscape of challenges that encompass technical, social, and ethical dimensions. While the technology enhances efficiency and innovation, it also poses significant risks, particularly in the labor market, where structural unemployment and social inequality are prominent concerns.

1. **Structural Unemployment**

   One of the most pressing challenges associated with AI-driven job automation is structural unemployment. This phenomenon occurs when machines or AI systems replace human jobs, particularly in sectors characterized by repetitive tasks that are easily automated. For instance, the banking industry has seen a notable shift with the introduction of chatbots, which have supplanted many customer service roles. These automated systems can efficiently handle various customer inquiries, from balance checks to loan applications, thereby increasing operational efficiency but simultaneously reducing the workforce in these areas (Kumar, 2024; Burley & Eisikovits, 2022). The implications of such automation extend beyond immediate job loss; they necessitate a robust framework for reskilling and upskilling the existing workforce. As traditional roles diminish, workers must be trained for more complex positions that AI cannot easily replicate. This transition requires substantial investment from both public and private sectors to develop training programs focused on digital and technical skills, ensuring that workers are equipped to thrive in an evolving job landscape (Vadie, 2023; Masriadi et al., 2023).

2. **Social Inequality**

   The impact of AI-driven job automation also exacerbates social inequality, particularly through the widening skills gap. Automation disproportionately affects low-skilled jobs, such as cashiers and factory workers, which are more susceptible to being replaced by machines. Conversely, high-skilled roles in technology and management see increased demand, creating a stark divide between low- and high-skilled workers. For instance, sectors like software development and cybersecurity are experiencing a surge in job opportunities for individuals with expertise in AI and data analytics (Braganza et al., 2021). This trend highlights a

concerning polarization in the labor market, where administrative and routine jobs are increasingly automated, while strategic roles that require critical thinking remain relatively secure (Frey & Osborne, 2017; Soueidan, 2024). Such dynamics threaten to deepen the economic divide, as those lacking the necessary skills to adapt to automation face significant challenges in securing employment. In conclusion, while AI-driven job automation offers substantial benefits in terms of efficiency and innovation, it also presents formidable challenges that must be addressed. Structural unemployment and social inequality are critical issues that arise from the displacement of workers and the growing skills gap. To mitigate these challenges, a concerted effort is required to invest in reskilling initiatives and to create a more equitable labor market that can adapt to the rapid changes brought about by AI technologies.

The challenges posed by economic distribution and ethical issues in the context of AI-driven job automation are increasingly significant in today's digital economy. The benefits of automation, particularly through artificial intelligence (AI), tend to be concentrated among a few large corporations, such as Google, Amazon, and Microsoft. These companies leverage AI to enhance operational efficiency and reduce costs, which allows them to dominate market share and accumulate wealth. This trend exacerbates income inequality, as smaller firms often lack the resources to invest in advanced AI technologies, leading to a competitive disadvantage and a widening economic gap (Wong, 2024; Farayola, 2023).

Moreover, the economic landscape is heavily influenced by the strategic management of AI technologies. Research indicates that small and medium-sized enterprises (SMEs) face significant barriers in adopting AI due to limited financial and technical resources. This situation is compounded by a lack of awareness and understanding of AI's potential benefits, which can hinder their competitiveness in a rapidly evolving market (Crockett et al., 2023; Cragg et al., 2013). The disparity in AI adoption not only affects individual businesses but also contributes to broader economic inequality, as the advantages of AI remain largely inaccessible to smaller players (Markan, 2024; Obschonka & Audretsch, 2019).

Ethical considerations surrounding AI are equally pressing. Data privacy issues arise as AI systems often require extensive datasets, which can include sensitive personal information. The misuse of such data, as exemplified by the Cambridge Analytica scandal, highlights the potential for significant ethical breaches that can undermine public trust in technology (Gatra, 2023; González, 2017). The ethical implications extend beyond privacy concerns; algorithmic bias is a critical issue as well. AI systems trained on biased datasets can perpetuate and even exacerbate existing inequalities, particularly in areas such as recruitment, where studies have shown that AI can discriminate against women and minority candidates due to historical biases embedded in the training data (Giuggioli & Pellegrini, 2022; Getchell et al., 2022). To address these multifaceted challenges, it is essential for stakeholders—including governments, businesses, and civil society—to collaborate on developing policies that promote equitable access to AI technologies and safeguard ethical standards. This collaborative approach can help ensure that the benefits of AI-driven automation are distributed more evenly across the economy and that ethical considerations are prioritized in the deployment of AI systems (Devereux et al., 2019; Anica-Popa, 2023). By fostering an inclusive and just transition to an AI-driven economy, we can mitigate the risks associated with economic inequality and ethical violations, ultimately leading to a more sustainable future.

4. Discussion

The integration of artificial intelligence (AI) into various sectors has led to significant improvements in operational efficiency and global productivity. One of the primary benefits of AI-driven job automation is its ability to optimize business processes that traditionally required extensive human labor. In the manufacturing sector, for instance, AI technologies, including robotics and machine learning, have been shown to enhance production capacity by 20-30% (Liu, 2024). This increased efficiency allows companies to produce more goods in less time,

thereby fostering economic growth in nations that invest in such technologies. A notable example is Toyota in Japan, which has successfully implemented AI in its production lines, resulting in faster car manufacturing, reduced downtime, and improved product quality (Liu, 2024). Moreover, AI facilitates better resource management, waste reduction, and minimization of human error in manual processes. In the food processing industry, AI systems that monitor environmental conditions like temperature and humidity can significantly enhance product quality while reducing waste (Onyeaka, 2023). This not only benefits individual companies but also contributes to global economic growth by enabling the production of goods at lower costs, which can stimulate market expansion (Xiao, 2023; Vyshnevskyi et al., 2019).

The relationship between AI and global markets is equally significant. AI-driven automation equips companies with the agility to respond swiftly to market fluctuations, which is crucial in today's dynamic business environment where consumer demands can shift rapidly. For instance, Walmart employs AI to analyze inventory and predict supply needs in real-time, allowing for efficient adjustments in production and distribution to avoid shortages or overstocking (Hasan, 2024). This capability is particularly vital during crises, such as the COVID-19 pandemic, where e-commerce giants like Amazon leveraged AI to optimize logistics and ensure timely deliveries despite unprecedented demand spikes (Modgil et al., 2021).

Furthermore, AI enhances supply chain resilience by improving visibility and risk management, which are essential for maintaining business continuity in the face of global economic uncertainties (Modgil et al., 2021). The ability to make data-driven decisions in real-time not only provides a competitive edge but also supports better procurement strategies, ensuring that companies can meet market demands effectively (Hasan, 2024; Modgil et al., 2021). As AI continues to evolve, its role in shaping operational efficiency and global productivity is expected to expand, further influencing economic landscapes worldwide (Xiao, 2023; Vyshnevskyi et al., 2019; Vinuesa et al., 2020). AI-based automation is having a major impact on the structure of the global labor market, particularly in creating structural unemployment. Repetitive and predictable jobs—such as those in manufacturing, customer service, and logistics—can be replaced with robotic systems and AI algorithms. These jobs previously held by human workers are now being replaced by machines that can work with greater efficiency and accuracy. A McKinsey Global Institute study (2023) estimates that up to 375 million workers worldwide may need to shift to new types of work by 2030 as a direct impact of AI-based automation. These changes not only create challenges for individuals who lose their jobs, but also cause disruption in the overall economic structure, changing the types of skills needed in the future workforce.

This economic transformation due to automation is more pronounced in sectors that are highly dependent on manual and routine work. The manufacturing industry, for example, has long used robots to increase production efficiency. However, now with increasingly advanced AI capabilities, this sector is increasingly automated, reducing the need for human labor. Automotive manufacturing is a clear example where factories such as Tesla and BMW use advanced robots to assemble vehicles with accuracy and speed that is difficult to achieve by human labor. On the other hand, the customer service sector is also affected, with many large companies replacing customer service representatives with AI-based chatbots. Bank of America, for example, has launched chatbot Erica, which can help customers solve various banking problems without human interaction. While sectors such as manufacturing and customer service are being pressured by automation, the information technology (IT) and creative services sectors are thriving. In the IT sector, the increasing use of cloud computing, big data, and AI is opening up new jobs in software development, data science, and cybersecurity. Jobs in AI development and cloud engineering are growing rapidly, as more companies invest in new technologies to digitize their operations. The creative sector also benefits from AI supporting creative processes, such as graphic design, content creation and

video editing. Workers in this field have the opportunity to develop new products and services that were previously unimaginable. However, while these sectors are growing, they also require specialized skills that the workforce affected by automation lacks, creating challenges in terms of reskilling and upskilling affected workers.

In addition to structural unemployment, AI-based automation also increases social inequality, especially in terms of access to technology and skills training. In developed countries, the ability to adapt to new technologies is higher due to better access to digital infrastructure and training programs designed to help the workforce transition to new, more complex jobs. Large companies in developed countries have sufficient resources to invest in automation and employee training, which allows them to remain competitive in a global market increasingly dominated by AI technologies. However, in developing countries, this inequality is widening due to lack of access to adequate digital infrastructure, such as fast internet and the latest technological devices. In many regions, especially in Sub-Saharan Africa or rural areas of Asia, lack of access to technology limits workers' ability to compete in a global marketplace increasingly dependent on AI. In this context, many workers in sectors affected by automation are unable to transition to new jobs due to lack of training or access to relevant technology courses. This causes the gap between developed and developing countries to widen in terms of their ability to adopt and utilize AI technology.

Distribution of profits from automation also creates greater inequality between large companies and small businesses. Large companies with sufficient capital can allocate large budgets for the adoption of AI and advanced technologies that support their operational efficiency. For example, Amazon uses AI to optimize its logistics and supply chain, allowing them to gain greater profits from the resulting efficiencies. On the other hand, it is small and medium businesses that have the opportunity until limited resources to invest in these technologies are often left behind, facing difficulties in competing with large companies that have adopted automation. This inequality exacerbates economic gaps, where the benefits of automation are uneven. Large companies, which have the resources to implement AI technology, benefit more, while small businesses or workers in sectors affected by automation tend to lag behind. In this context, it is important to create policies that support technology funding for small businesses and training programs for workers in developing countries so that they can compete and adapt to changes occurring due to AI-based automation. Overall, AI-based automation not only brings challenges in terms of structural unemployment, but also exacerbates social inequality between developed and developing countries as well as between large companies and small businesses. Therefore, collaboration between governments, the private sector and international organizations is needed to address these challenges in an inclusive way, developing policies that facilitate access to technology and training for workers around the world.

To overcome the impact of AI-based automation, reskilling and skills development (upskilling) are the main strategies that need to be implemented. Governments and organizations must invest in programs that can help workers impacted by automation to transition to new jobs that are more complex and relevant to evolving market needs. Retraining is critical to ensure that the workforce is not marginalized in this technological revolution. A clear example of these efforts can be found in technology training programs supported by large companies such as IBM, which launched an initiative to help workers affected by automation by providing advanced digital and technology skills training. IBM, for example, has a reskilling program that allows workers to move from traditional jobs to new jobs in technology fields such as data science, cloud computing, and cybersecurity. This program provides an opportunity for workers who previously did not have a technology background to gain the skills needed in a workforce dominated by AI and digital technology.

Additionally, it is also important to curate an educational curriculum that focuses on developing skills that are not easily automated by AI, such as creativity, critical thinking, and

interpersonal skills. These skills are especially needed in fields that prioritize human innovation and collaboration, such as management, education, and design. Therefore, the education system needs to be adapted to the demands of an increasingly dynamic job market, paying more attention to strengthening skills human value in jobs that cannot be replaced by technology. To ensure that the benefits of automation can be shared fairly across society, governments can adopt inclusive policies that introduce tax approaches that support social welfare. One approach that has been considered is a robot tax, which would be applied to companies that replace human jobs with AI or robot technology. The aim of this robot tax is to fund social programs, training and empowerment of workers affected by automation. For example, several European countries, such as Germany and Belgium, have put forward robot tax proposals as a way to address the social impact of the increasing use of robots and AI in industry. By taxing companies that rely on automation, governments can raise funds to be used for worker retraining programs, improving technological infrastructure in developing countries, and to protect affected workers by creating stronger social safety nets.

Apart from that, multisectoral collaboration is also very important to overcome social and economic inequality generated by automation. Companies, governments and educational institutions need to work together to create adaptation strategies that are inclusive and can cover all levels of society. This collaboration is critical to creating training initiatives that meet market needs and ensuring that workers from diverse backgrounds have equal opportunities to thrive. A successful example of multisectoral collaboration can be seen in Singapore, which has introduced the Smart Nation initiative. Through Smart Nation, the Singapore government is working with the private sector to introduce technology infrastructure that supports the widespread adoption of AI in society. This initiative not only aims to increase the efficiency of the public and private sectors, but also to maintain worker welfare by creating technology training programs that can help workers transition to new, more technology-based sectors. The training program also prioritizes skills relevant to digital transformation, including data analytics, cloud computing and software development. In this context, the government must play an important role by providing incentives and support for companies to invest in skills training. In addition, the private sector needs to be more proactive in developing training and employee empowerment programs, while educational institutions must adapt to technological developments and provide education that prepares future generations to face an increasingly automated world of work. Overall, AI-based automation challenge mitigation strategies require a holistic and inclusive approach. Retraining and skills development programs are key to creating a workforce ready to adapt to new technologies, while tax policies that support the distribution of benefits from automation can help create a fairer system. Multisectoral collaboration between companies, governments, and educational institutions is an important step to ensure that every individual has the opportunity to participate in AI-driven economic progress.

5. Conclusion

Artificial intelligence-based automation (AI-driven job automation) has become a key factor in global economic transformation. This technology not only improves operational efficiency, but also changes the landscape of the labor market and various industrial sectors. As more and more jobs can be done automatically by AI, businesses and organizations around the world have seen significant changes in the way they operate and develop. AI-based automation enables tremendous increases in efficiency, reduced operational costs, and the creation of new products that were previously impossible due to the limitations of traditional technology. In the manufacturing sector, for example, the use of robotics and AI algorithms has enabled faster and cheaper production, while in the healthcare sector, AI has enabled faster and more accurate diagnoses, increasing efficiency in patient care and reducing previously significant cost

burdens. With the adoption of this technology, many industries can now innovate in more sophisticated and highly competitive ways, creating previously unimaginable opportunities.

However, even though it provides many benefits, AI-driven job automation also brings challenges that cannot be ignored. Structural unemployment is a major issue, where many repetitive jobs previously held by humans are now being replaced by machines. This has caused a major shift in the structure of the labor market, with most workers having to shift to types of work that are more complex or require higher skills. Additionally, this automation increases social and economic inequality, widening the gap between those with high skills and those with low skills. Workers with highly technical skills, such as programmers or AI specialists, are increasingly in demand, while workers with more basic skills are increasingly marginalized. In addition, ethical issues related to AI technology, such as algorithmic bias that can influence important decisions, And data privacy the more vulnerable users are, the more it becomes a major concern. As this automation expands, stricter policies are needed to ensure that AI is used ethically and does not has a greater negative impact on society.

To ensure that the benefits of AI-driven job automation can be felt evenly, strategic steps need to be taken involving various parties, including the government, companies and the wider community. Governments play an important role in designing policy frameworks that support inclusive and equitable automation. One step that could be taken is to implement a robot tax, which would provide funds to fund retraining programs for workers who are at risk of losing their jobs due to automation. With this tax, the government can support initiatives that can help workers transition to new jobs that are more relevant to technological developments. In addition, the government needs to encourage multisectoral collaboration between the private sector, educational institutions and the community to create solutions that support workforce transition, so that affected workers can adapt to the changes that are occurring. The government must also ensure that the policies implemented do not only support high-tech sectors, but also pay attention to sectors that are vulnerable to automation.

Companies also have a big responsibility in managing these changes. Companies need to integrate effective skills training programs for their employees, so that they can adapt to the new roles that emerge as a result of automation. This training should be designed to help workers acquire skills relevant to future labor market needs, such as skills in operating and maintaining AI technology or skills in jobs that combine creativity and technology. In addition, companies must ensure that the development of AI technology is carried out with clear ethical principles to reduce the risk of algorithmic bias, as well as to protect the privacy of user data. This is very important, because the more technology develops, the higher the potential for misuse of data and unfair decision making.

To further explore the impact of AI-driven job automation and find appropriate solutions, future research needs to focus on several critical areas. First, retraining and skills development strategies are areas that need more attention. Further research could explore the most effective training methods to help workers impacted by automation transition into new roles. One method worth researching is AI-based learning, which uses technology to create a more personalized and adaptive training experience. A hybrid approach that combines online and face-to-face learning can also be an effective solution, given its flexibility to reach workers in multiple locations. Case studies in various sectors also need to be conducted to evaluate the success of existing retraining initiatives and gain deeper insight into their effectiveness.

Additionally, adapting technology for the future workforce is also an important topic that needs attention. Research could focus on how technology can be adapted to support workers who lack technical skills. AI has the potential to create new jobs that combine human and technological skills, and this needs to be studied further, especially regarding the types of jobs that could emerge and how the transition can be made smoothly. Research also needs to explore how technology can be used to help disadvantaged workers, who are marginalized by these major changes, so that they do not get left behind in global competition.

Finally, the social and economic disparities created by automation should be a major focus of future research. Research on how developing countries can reduce the technology gap will be helpful in facing the challenges of AI-driven job automation. These countries often lag behind in terms of technological infrastructure and training, making it difficult for them to keep up with global developments. Further research is also needed to understand the dynamics of the distribution of economic benefits from automation between developed and developing countries, and how these countries can leverage technology to reduce widening social and economic inequalities.

6. REFERENCES

Abdelsalam, H. (2024). The transformative potential of artificial intelligence in the maritime transport and its impact on port industry. Maritime Research and Technology, 3(1), 19. https://doi.org/10.21622/mrt.2024.03.1.752

al., N. (2023). Exploring the use of ai in autonomous vehicles, drones, and robotics for perception, navigation and decision-making. tjjpt, 44(3), 01-09. https://doi.org/10.52783/tjjpt.v44.i3.230

Anica-Popa, L. (2023). Ai – powered business services in the hyperautomation era. Proceedings of the International Conference on Business Excellence, 17(1), 1036-1050. https://doi.org/10.2478/picbe-2023-0094

Anica-Popa, L. (2023). Ai – powered business services in the hyperautomation era. Proceedings of the International Conference on Business Excellence, 17(1), 1036-1050. https://doi.org/10.2478/picbe-2023-0094

Atadoga, A. (2024). Ai's evolving impact in us banking: an insightful review. International Journal of Science and Research Archive, 11(1), 904-922. https://doi.org/10.30574/ijsra.2024.11.1.0157

Badet, J. (2021). Ai, automation and new jobs. Open Journal of Business and Management, 09(05), 2452-2463. https://doi.org/10.4236/ojbm.2021.95132

Bathla, G., Bhadane, K., Singh, R., Kumar, R., Aluvalu, R., Krishnamurthi, R., … & Basheer, S. (2022). Autonomous vehicles and intelligent automation: applications, challenges, and opportunities. Mobile Information Systems, 2022, 1-36. https://doi.org/10.1155/2022/7632892

Braganza, A., Chen, W., Canhoto, A., & Sap, S. (2021). Gigification, job engagement and satisfaction: the moderating role of ai enabled system automation in operations management. Production Planning & Control, 33(16), 1534-1547. https://doi.org/10.1080/09537287.2021.1882692

Burley, J. and Eisikovits, N. (2022). Workplace automation and political replacement: a valid analogy?. Ai and Ethics, 3(4), 1361-1370. https://doi.org/10.1007/s43681-022-00245-6

Cheng, W., Pien, L., & Cheng, Y. (2020). Occupation-level automation probability is associated with psychosocial work conditions and workers' health: a multilevel study. American Journal of Industrial Medicine, 64(2), 108-117. https://doi.org/10.1002/ajim.23210

Cheng, W., Pien, L., Kubo, T., & Cheng, Y. (2020). Trends in work conditions and associations with workers' health in recent 15 years: the role of job automation probability. International Journal of Environmental Research and Public Health, 17(15), 5499. https://doi.org/10.3390/ijerph17155499

Chintalapati, S. and Pandey, S. (2021). Artificial intelligence in marketing: a systematic literature review. International Journal of Market Research, 64(1), 38-68. https://doi.org/10.1177/14707853211018428

Cioffi, R., Travaglioni, M., Piscitelli, G., Petrillo, A., & Felice, F. (2020). Artificial intelligence and machine learning applications in smart production: progress, trends, and directions. Sustainability, 12(2), 492. https://doi.org/10.3390/su12020492

Cragg, P., Mills, A., & Suraweera, T. (2013). The influence of it management sophistication and it support on it success in small and medium-sized enterprises. Journal of Small Business Management, 51(4), 617-636. https://doi.org/10.1111/jsbm.12001

Crockett, K., Gerber, L., Latham, A., & Colyer, E. (2023). Building trustworthy ai solutions: a case for practical solutions for small businesses. Ieee Transactions on Artificial Intelligence, 4(4), 778-791. https://doi.org/10.1109/tai.2021.3137091

Devereux, E., Grimmer, L., & Grimmer, M. (2019). Consumer engagement on social media: evidence from small retailers. Journal of Consumer Behaviour, 19(2), 151-159. https://doi.org/10.1002/cb.1800

Ernst, E., Merola, R., & Samaan, D. (2019). Economics of artificial intelligence: implications for the future of work. Iza Journal of Labor Policy, 9(1). https://doi.org/10.2478/izajolp-2019-0004

Eyo-Udo, N. (2024). Leveraging artificial intelligence for enhanced supply chain optimization. Open Access Research Journal of Multidisciplinary Studies, 7(2), 001-015. https://doi.org/10.53022/oarjms.2024.7.2.0044

Farayola, O. (2023). Innovative business models driven by ai technologies: a review. Computer Science & It Research Journal, 4(2), 85-110. https://doi.org/10.51594/csitrj.v4i2.608

Frey, C. and Osborne, M. (2017). The future of employment: how susceptible are jobs to computerisation?. Technological Forecasting and Social Change, 114, 254-280. https://doi.org/10.1016/j.techfore.2016.08.019

Garikapati, D. (2024). Autonomous vehicles: evolution of artificial intelligence and the current industry landscape. Big Data and Cognitive Computing, 8(4), 42. https://doi.org/10.3390/bdcc8040042

Gatra, A. (2023). The power of data analytics and microtargeting in political campaigns, cambridge analytica strategy, donald trump victory the 2016 u.s. presidential election.. https://doi.org/10.4108/eai.15-9-2022.2335937

Getchell, K., Carradini, S., Cardon, P., Fleischmann, C., Ma, H., Aritz, J., … & Stapp, J. (2022). Artificial intelligence in business communication: the changing landscape of research and teaching. Business and Professional Communication Quarterly, 85(1), 7-33. https://doi.org/10.1177/23294906221074311

Giuggioli, G. and Pellegrini, M. (2022). Artificial intelligence as an enabler for entrepreneurs: a systematic literature review and an agenda for future research. International Journal of Entrepreneurial Behaviour & Research, 29(4), 816-837. https://doi.org/10.1108/ijebr-05-2021-0426

González, R. (2017). Hacking the citizenry?: personality profiling, 'big data' and the election of donald trump. Anthropology Today, 33(3), 9-12. https://doi.org/10.1111/1467-8322.12348

Guo, W. (2023). Exploring the value of ai technology in optimizing and implementing supply chain data for pharmaceutical companies. Innovation in Science and Technology, 2(3), 1-6. https://doi.org/10.56397/ist.2023.05.01

Hao, C. (2024). Artificial intelligence and operational efficiency of chinese manufacturing firms. INTCJ, 1(1), 28-39. https://doi.org/10.69659/qcqt7937

Hasan, R. (2024). Managing artificial intelligence in international business: toward a research agenda on sustainable production and consumption. Thunderbird International Business Review, 66(2), 151-170. https://doi.org/10.1002/tie.22369

Ikumapayi, O., Kayode, J., Afolalu, S., Nnochiri, E., Olowe, K., & Bodunde, O. (2022). A study on ai and ict for sustainable manufacturing.. https://doi.org/10.46254/af03.20220259

KULYNYCH, V. (2024). Analysis of modern methods for optimizing technological processes in machine-building production using artificial intelligence. Modern Technologies in Mechanical Engineering and Transport, 1(22), 31-37. https://doi.org/10.36910/automash.v1i22.1342

Kumar, D. (2024). Ethical and legal challenges of ai in marketing: an exploration of solutions. Journal of Information Communication and Ethics in Society, 22(1), 124-144. https://doi.org/10.1108/jices-05-2023-0068

Liu, J. (2024). Impact of artificial intelligence on manufacturing industry global value chain position. Sustainability, 16(3), 1341. https://doi.org/10.3390/su16031341

Markan, D. (2024). Rise of artificial intelligence in business and industry. jier, 4(2). https://doi.org/10.52783/jier.v4i2.850

Masriadi, M., Ekaningrum, N., Hidayat, M., & Yuliati, F. (2023). Exploring the future of work: impact of automation and artificial intelligence on employment. Endless International Journal of Future Studies, 6(1), 125-136. https://doi.org/10.54783/endlessjournal.v6i1.131

Mishra, S., Ewing, M., & Cooper, H. (2022). Artificial intelligence focus and firm performance. Journal of the Academy of Marketing Science, 50(6), 1176-1197. https://doi.org/10.1007/s11747-022-00876-5

Modgil, S., Singh, R., & Hannibal, C. (2021). Artificial intelligence for supply chain resilience: learning from covid-19. The International Journal of Logistics Management, 33(4), 1246-1268. https://doi.org/10.1108/ijlm-02-2021-0094

Mulas-Granados, C., Varghese, R., Boranova, V., deChalendar, A., & Wallenstein, J. (2019). Automation, skills and the future of work. Imf Working Paper, 19(288). https://doi.org/10.5089/9781513519906.001

Narine, D. (2023). Associations between education, information-processing skills, and job automation risk in the united states. Journal of Adult and Continuing Education, 30(1), 152-169. https://doi.org/10.1177/14779714231213004

Obschonka, M. and Audretsch, D. (2019). Artificial intelligence and big data in entrepreneurship: a new era has begun. Small Business Economics, 55(3), 529-539. https://doi.org/10.1007/s11187-019-00202-4

Onyeaka, H. (2023). Using artificial intelligence to tackle food waste and enhance the circular economy: maximising resource efficiency and minimising environmental impact: a review. Sustainability, 15(13), 10482. https://doi.org/10.3390/su151310482

Rao, K. (2024). Ai and ml in ir4.0: a short review of applications and challenges. Malaysian Journal of Science and Advanced Technology, 141-148. https://doi.org/10.56532/mjsat.v4i2.291

Singh, P. (2023). Digital transformation in supply chain management: artificial intelligence (ai) and machine learning (ml) as catalysts for value creation. International Journal of Supply Chain Management, 12(6), 57-63. https://doi.org/10.59160/ijscm.v12i6.6216

Sofoluwe, O. (2024). Ai-enhanced subsea maintenance for improved safety and efficiency: exploring strategic approaches. International Journal of Science and Research Archive, 12(1), 114-124. https://doi.org/10.30574/ijsra.2024.12.1.0766

Soueidan, M. (2024). The impact of artificial intelligence on job loss: risks for governments. Technium Social Sciences Journal, 57, 206-223. https://doi.org/10.47577/tssj.v57i1.10917

Tsai, J., Umucu, E., & Fish, K. (2022). Job automation and concerns during the covid-19 pandemic among middle and low-income us adults. Journal of Occupational and Environmental Medicine, 65(2), 113-118. https://doi.org/10.1097/jom.0000000000002734

Vadie, A. (2023). Industry 4.0: new challenges for the labor market and working conditions as a result of emergence of robots and automation. Economic and Regional Studies / Studia Ekonomiczne I Regionalne, 16(3), 434-445. https://doi.org/10.2478/ers-2023-0028

Valeriya, G. (2024). Ai-powered super-workers: an experiment in workforce productivity and satisfaction. Bio Web of Conferences, 86, 01065. https://doi.org/10.1051/bioconf/20248601065

Verma, D. (2018). Analysis of smart manufacturing technologies for industry using ai methods. Turkish Journal of Computer and Mathematics Education (Turcomat), 9(2), 529-540. https://doi.org/10.17762/turcomat.v9i2.13857

Vermesan, O., John, R., Pype, P., Daalderop, G., Kriegel, K., Mitic, G., … & Waldhör, S. (2021). Automotive intelligence embedded in electric connected autonomous and shared vehicles technology for sustainable green mobility. Frontiers in Future Transportation, 2. https://doi.org/10.3389/ffutr.2021.688482

Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., … & Nerini, F. (2020). The role of artificial intelligence in achieving the sustainable development goals. Nature Communications, 11(1). https://doi.org/10.1038/s41467-019-14108-y

Vyshnevskyi, O., Lyashenko, V., & Amosha, O. (2019). The impact of industry 4.0 and ai on economic growth. Scientific Papers of Silesian University of Technology Organization and Management Series, 9(6), 391-400. https://doi.org/10.29119/1641-3466.2019.140.32

Wang, K., Lu, L., Fang, J., Xing, Y., Tong, Z., & Wang, L. (2023). The downside of artificial intelligence (ai) in green choices: how ai recommender systems decrease green consumption. Managerial and Decision Economics, 44(6), 3346-3353. https://doi.org/10.1002/mde.3882

Weng, W. (2024). Development trend and challenge analysis of manufacturing industry under the background of artificial intelligence. Highlights in Business Economics and Management, 24, 234-239. https://doi.org/10.54097/0acbfn94

WONG, J. (2024). Factors influencing the adoption of artificial intelligence in accounting among micro, small medium enterprises (msmes). Quantum Journal of Social Sciences and Humanities, 5(1), 16-28. https://doi.org/10.55197/qjssh.v5i1.323

Xian, F. (2022). Quantifying the impact of artificial intelligence technology on china's manufacturing employment., 46. https://doi.org/10.1117/12.2640987

Xiao, Y. (2023). The multifaceted relationship between ai and economics: impacts, challenges, and insights. Journal of Economics and Management Sciences, 6(3), p1. https://doi.org/10.30560/jems.v6n3p1

Zerbino, P., Aloini, D., Dulmin, R., & Mininno, V. (2019). Towards analytics-enabled efficiency improvements in maritime transportation: a case study in a mediterranean port. Sustainability, 11(16), 4473. https://doi.org/10.3390/su11164473

Zhang, Q., Lu, J., & Jin, Y. (2020). Artificial intelligence in recommender systems. Complex & Intelligent Systems, 7(1), 439-457. https://doi.org/10.1007/s40747-020-00212-w