PROCEEDING ICONIES
FACULTY OF ECONOMICS
UIN MAULANA MALIK IBRAHIM MALANG
P-ISSN: 2476-9851 / E-ISSN: 2541-3333

THE APPLICATION OF ARTIFICIAL INTELLIGENCE TO INDONESIAN E-COMMERCE PLATFORMS AND ITS IMPACT ON DIGITAL ECONOMIC GROWTH

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ABSTRACT
This study explores the implementation of Artificial Intelligence (AI) in Indonesian e-commerce platforms and its impact on digital economic growth. The findings highlight three key aspects. First, AI has transformed e-commerce operations through personalized product recommendations, natural language processing (NLP) chatbots, and dynamic pricing systems, which enhance customer experience, increase sales, and build loyalty. Second, AI contributes significantly to business efficiency and growth by integrating with Business Intelligence to accelerate data analysis, support accurate decision-making, and reduce operational costs, while automation enables firms to optimize resources and develop new digital business models. Third, AI strengthens Indonesia's digital economy by expanding market access, especially for micro, small, and medium enterprises (MSMEs), and by fostering digital financial inclusion through AI-driven services such as credit scoring and micro-lending. With projections estimating Indonesia's digital economy to reach USD 130 billion by 2025, AI is recognized as a critical driver for inclusive and sustainable growth. Nevertheless, its success depends on supportive infrastructure, skilled human resources, and adaptive regulations to balance innovation with consumer protection.

Keywords: Artificial Intelligence, E-Commerce, Digital Economy, Business Efficiency, MSMEs

INTRODUCTION

The development of information and communication technology has become a key driver of digital transformation across various sectors of life. One of the most influential forms of technological advancement is Artificial Intelligence (AI), which is now widely adopted by industrial sectors, including e-commerce. AI enables more effective business process automation, large-scale data analysis, and personalized consumer experiences. In Indonesia, internet penetration, which will reach 77% of the population by 2023, further strengthens e-commerce's position as a key pillar of the digital economy, while also opening up vast opportunities for the application of AI to accelerate the growth of this industry. (Amri Luthfiansyah et al., 2024).

E-commerce in Indonesia has experienced rapid growth, particularly following the COVID-19 pandemic, which pushed people to shift to digital transactions. This increase is not limited to large companies, but also to Micro, Small, and Medium Enterprises (MSMEs) that have begun utilizing online platforms. AI has emerged as a key technology in optimizing various aspects, from product recommendation systems and customer service chatbots to real-time market trend detection. This implementation has proven to improve operational efficiency and expand market access, enabling MSMEs to better compete in the digital ecosystem (Nury Khirdany et al., 2025). Furthermore, AI plays a crucial role in strengthening the competitiveness of Indonesia's e- commerce industry globally. Technologies such as machine learning and deep learning enable platforms to predict consumer behavior, manage supply chains, and implement dynamic pricing. This allows companies not only to improve customer satisfaction but also to increase profitability. Studies show that AI-based recommendation systems can increase sales by up to 35%, while dynamic pricing can boost profitability by up to 20% (Amri Luthfiansyah et al., 2024)

Indonesia's digital economy, projected to grow to US$130 billion by 2025, makes AI adoption a strategic necessity. E-commerce, as the primary driver of the digital economy, contributes the largest share of Gross Merchandise Value (GMV). The implementation of AI in this sector not only improves business efficiency but also contributes to the creation of new jobs in technology fields such as data science and cybersecurity. This demonstrates that the integration of AI with e-commerce has a dual impact: at the micro level (companies and MSMEs) and the macro level (national economic growth) (Cahyati et al., 2024).

However, behind these significant opportunities, a number of challenges must be addressed. These include limited technological infrastructure, a digital skills gap in the workforce, data protection issues, and high implementation costs, particularly for MSMEs. Without an inclusive adoption strategy, AI development risks creating new gaps in the digital economy ecosystem. Therefore, studying the application of AI to e-commerce in Indonesia is crucial for understanding the opportunities, impacts, and challenges that must be anticipated to support sustainable digital economic growth.

Previous studies have shown that the application of AI to e-commerce has significantly contributed to improving business performance and user experience. Cahyati et al. (2024) emphasized that the integration of Business Intelligence with AI can accelerate data analysis, predict market trends, and support more effective marketing strategies. Other research by Luthfiansyah et al. (2024) found that AI-based recommendation systems can increase sales by up to 35% and strengthen customer loyalty through personalized service. Furthermore, a study by Mardiana et al. (2024) highlighted that although MSMEs in Indonesia have begun to utilize AI, adoption is still limited to chatbots and simple applications, necessitating infrastructure support and training for broader impact. Overall, these studies underscore that AI plays a central role in accelerating e- commerce growth while also presenting new challenges related to regulation, technological readiness, and adoption inclusiveness.

This article aims to analyze the application of Artificial Intelligence on e-commerce platforms in Indonesia and examine its impact on the growth of the national digital economy. By examining the opportunities, benefits, and challenges, this article is expected to provide a comprehensive overview of how AI acts as a catalyst in increasing competitiveness, expanding market access for MSMEs, and driving inclusive and sustainable economic growth. Furthermore, this paper is also expected to serve as an academic and practical reference for industry players, policymakers, and researchers interested in developing the digital economy in Indonesia.

LITERATURE REVIEW

Artificial Intelligence (AI)

Artificial Intelligence (AI) is a multidisciplinary field within computer science that focuses on the development of intelligent systems capable of mimicking, simulating, and even surpassing human cognitive abilities. According to Russell & Norvig, AI is defined as the study of intelligent agents that can perceive their environment, process information, and take action to optimally achieve specific goals (Russel & Norvig, 2022). This definition emphasizes AI's adaptive capabilities in dealing with dynamic situations.

AI is defined as "the science of making machines do things that, if done by humans, would require intelligence." This definition emphasizes that AI aims to mimic human cognitive functions, such as reasoning, problem-solving, and learning. A similar view was expressed by McCarthy, the figure who first introduced the term AI at the 1956 Dartmouth conference, who described AI as "the science and engineering of making intelligent machines."

From a practical perspective, Kaplan & Haenlein divide AI into two main categories: (1) Weak AI (Narrow AI): AI designed to perform specific tasks, such as product

recommendation systems in e-commerce or virtual assistants like Siri and Alexa, (2) Strong AI (General AI): AI that has the ability to reason and solve problems in a general way, similar to humans. This concept is still theoretical and is a long-term goal of AI research (Kaplan & Haenlein, 2020).

Furthermore, AI is also seen as a transformational technology. It is one of the main driving forces in the fourth industrial revolution because it can transform the way humans work, interact, and make decisions. Thus, AI is not simply a technical tool, but a new paradigm in creating economic and social value (Huang & Rust, 2018).

E-Commerce

Electronic Commerce (E-Commerce) is a process of buying and selling goods, services, and information through electronic networks, particularly the internet. According to Laudon & Traver, e-commerce is a business activity that uses digital technology as the primary intermediary in the value exchange process between producers and consumers. In other words, e-commerce is not just an online store, but encompasses all digital activities that support business interactions, including marketing, distribution, payments, and after-sales service (Laudon & Traver, 2018). E-commerce can be understood as a modern form of commerce that allows sellers and buyers to transact without face-to-face interaction. This provides efficiencies in time and cost, while expanding market reach. The growth of e-commerce is also accelerated by internet penetration, smartphone use, and the development of digital payment technologies such as e-wallets.

Digital Economy

The digital economy is an economic activity based on the use of digital technology, data, and internet networks as the primary source of value creation. The digital economy represents a new economic order in which information becomes the primary factor of production, replacing the dominant role of manual labor and traditional capital. Meanwhile, according to Bukht & Heeks, the digital economy can be understood as part of the economy powered by digital technology, ranging from digital infrastructure and online services to applications that transform the methods of production, distribution, and consumption (Bukht & Heeks, 2018).

In the Indonesian context, the Ministry of Communication and Informatics (Kominfo) defines the digital economy as an economic system supported by the development of information technology, particularly the internet, which drives transaction efficiency, expands market access, and creates new business opportunities. Its role is becoming increasingly important with national internet penetration and the massive growth of the technology startup ecosystem.

METHODS

This research uses a qualitative approach with descriptive methods. This method was chosen because it is appropriate for exploring the phenomenon of Artificial Intelligence (AI) implementation on Indonesian e-commerce platforms and understanding its impact on digital economic growth. Research data was collected through library research by reviewing various academic sources, such as scientific journals, industry reports, research articles, and official publications from government and international institutions. These sources were selected because they provide a comprehensive understanding of the development of AI, e-commerce, and their contribution to the digital economy.Data analysis was conducted using descriptive qualitative analysis techniques, namely reducing information from the literature, classifying key themes, and then presenting it in a systematic narrative form. The research stages included identifying theoretical concepts, comparing previous research results, and synthesizing them to draw relevant conclusions. This approach is expected to produce a study that is not only conceptual but also has practical implications for policy development, business strategy, and digital innovation in Indonesia.

RESULTS

AI Implementation on E-Commerce Platforms in Indonesia

Research has shown that the application of Artificial Intelligence (AI) in Indonesia's e-commerce sector has grown rapidly, although it still faces various challenges. AI technology is most widely used in product recommendation systems, customer service chatbots, dynamic pricing, and logistics management. AI-based recommendation algorithms can increase sales by up to 35% by providing more relevant and personalized product recommendations, while strengthening consumer loyalty. Tokopedia and Shopee, for example, have integrated AI to enhance the personalization of the user experience, strengthen customer trust, and improve operational efficiency (Sifa et al., 2024).

Additionally, AI technology is being used to automate customer service. Natural Language Processing (NLP)-based chatbots allow consumers to receive fast and accurate answers without having to interact with a human agent. According to Mardiana, several MSMEs in Indonesia have adopted simple chatbots to serve customers in marketplaces, although adoption is uneven due to limited resources and infrastructure. (Octaviyani et al., 2024). Hal ini menunjukkan bahwa AI tidak hanya dimanfaatkan oleh perusahaan besar, tetapi juga mulai merambah ke level usaha kecil sebagai bagian dari transformasi digital. This shows that AI is not only being utilized by large companies, but is also starting to penetrate the small business level as part of digital transformation.

The Impact of AI on Business Efficiency and Growth

The implementation of AI has been proven to have a direct impact on the operational efficiency of e-commerce companies. Cahyati demonstrated that the integration of Business Intelligence (BI) with AI enables companies to analyze millions of transaction data points quickly, predict market trends, and optimize marketing strategies. With the support of predictive algorithms, companies are able to project consumer demand more accurately, reduce the risk of overstocking or understocking, and lower logistics costs. This not only improves internal company performance but also strengthens customer satisfaction by ensuring products are available as needed (Wahyudi, 2023).

Furthermore, AI also drives the automation of business processes. Many administrative tasks, such as inventory management, delivery scheduling, and customer service, can now be automated through AI-based systems. This automation can increase efficiency by up to 30% by reducing manual workloads and minimizing human error. In the long run, this increases company profitability because human resources can be diverted to more strategic and creative activities (Amri Luthfiansyah et al., 2024).
Furthermore, AI contributes to innovation in digital business models. Amazon, Tokopedia, and Shopee, for example, are leveraging big data analytics and machine learning to expand their services, from mere marketplaces to digital ecosystems encompassing financial services, digital advertising, and technology-based logistics solutions. This innovation expands revenue streams while strengthening consumer dependence on the platform. In Indonesia, this phenomenon is evident in the emergence of digital wallet (e-wallet) services and AI-based installment payment features that enhance convenience and increase transaction frequency.

Thus, the impact of AI on business efficiency and growth is not only limited to cost savings but also to the creation of new value within the e-commerce ecosystem. This aligns with Brynjolfsson & McAfee's findings, which identify AI as a driver of the fourth industrial revolution, due to its ability to transform the way companies operate and generate sustainable profits. Therefore, e-commerce companies that successfully integrate AI strategically are projected to have a significant competitive advantage in both the Indonesian and global digital markets (Brynjolfsson & McAfee, 2017).

AI and Contribution to Indonesia's Digital Economy

AI has become a key catalyst for the growth of Indonesia's digital economy. The Google-

Temasek-Bain e-Conomy SEA 2024 report estimates that Indonesia's digital economy will reach US$90 billion in 2024 and grow to US$130 billion by 2025, making it the largest in Southeast Asia. E-commerce, the dominant sector, contributes the largest portion of this value, with AI supporting innovation and efficiency. AI technology enables the automation of various business processes, such as logistics and digital marketing, thereby increasing company productivity and accelerating transactions in the digital marketplace.

Another significant contribution is the role of AI in strengthening the digitalization of Micro, Small, and Medium Enterprises (MSMEs). Mardiana's research highlights that although some MSMEs are still limited in their technology adoption, the use of simple AI-based applications such as chatbots or product recommendation systems has helped them increase market access. By leveraging AI, MSMEs can target more specific consumers, reduce promotional costs, and increase product visibility on marketplace platforms. This not only increases MSME competitiveness in the domestic market but also opens up opportunities for expansion into global markets through cross-border platform integration (Mardiana et al., 2024).

Beyond commerce, AI also contributes to digital financial inclusion. Through the integration of e-commerce and AI-based financial services such as credit scoring or microloan offerings, many small businesses now have access to financing that was previously difficult to obtain. AI algorithms have been found to increase the effectiveness of personalized digital financial product offerings, thereby increasing consumer trust and encouraging online transactions (Masaguni et al., 2024). In the long term, this will expand the user base of formal financial services while enhancing Indonesia's competitiveness in the regional digital market. While AI's contribution to the digital economy is significant, the challenges it poses cannot be ignored. Key barriers include high implementation costs, limited digital literacy, and consumer privacy and data protection issues. If not addressed, the digital divide between large companies and MSMEs will widen. Therefore, policy strategies that encourage inclusive adoption are needed, such as tax incentives for technology investment, human resource training programs, and stronger data protection regulations. Collaboration between government, industry, and academia is key to ensuring AI's contributions truly impact the growth of an inclusive, sustainable, and globally competitive digital economy.

CONCLUSION

The study's findings indicate that the implementation of Artificial Intelligence (AI) on e-commerce platforms in Indonesia plays a highly strategic role in strengthening the digital economy ecosystem. First, AI has transformed the way e-commerce platforms operate through personalized services, product recommendation systems, NLP-based chatbots, and dynamic pricing. This implementation not only enhances the consumer experience but also drives increased sales and customer loyalty.

Second, AI has been proven to have a significant impact on business efficiency and growth. The integration of AI with Business Intelligence accelerates transaction data analysis, supports more accurate decision-making, and reduces operational costs. Furthermore, business process automation enables e-commerce companies to maximize resources, reduce human error, and open up space for innovation in new digital business models. This strengthens companies' competitiveness both nationally and globally.

Third, the contribution of AI to Indonesia's digital economy is significant. E-commerce, as a key sector driving the digital economy, has successfully expanded market access, particularly for MSMEs, through the application of AI-based technology. Furthermore, the integration of AI with digital financial services has also driven financial inclusion, expanded the user base of formal services, and created new business opportunities. With Indonesia's digital economy projected to reach USD 130 billion by 2025, it's clear that AI is a crucial driver of national economic transformation.

Overall, it can be concluded that the application of AI to e-commerce not only improves company performance but also strengthens the foundation for more inclusive and sustainable digital economic growth. However, the success of AI adoption depends heavily on infrastructure readiness, the quality of human resources, and regulations that support data protection and technological innovation. Collaboration between government, industry, and academia is key to maximizing AI's potential for the advancement of Indonesia's digital economy.

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