MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages 5872-5878

# Optimizing Business Competitiveness Through Artificial Intelligence: A Framework for Digital Innovation and Operational Efficiency

[1]Faisal Binsar, [2]Indra Wahyudi, [3]Gaguk Dwi Prasetyo Atmoko, [4]Fitriadi Nurdin, [5]Teguh Nur santoso
[1]Faculty of Economics and Business, Muhammadiyah University of Berau, Indonesia 77315
[2] Information Systems Management Department, Bina Nusantara University, Indonesia 11480
[3] BINUS Business School Doctor of Research in Management, Bina Nusantara University, Jakarta, Indonesia 11480
[4] Learning and Exams Division, Universitas Terbuka Majene, Indonesia 91412
[5] Marketing and Registration Division, Universitas Terbuka Jayapura, Indonesia 99358
[1]faisal_binsar@umberau.ac.id, [2]indra.wahyudi001@binus.ac.id, [3]gaguk.atmoko@binus.ac.id, [4]fitriadi@ecampus.ut.ac.id,
[5]teguhn@ecampus.ut.ac.id

***Abstract*—** The rapid advancement of artificial intelligence (AI) has transformed the business landscape, enabling firms to enhance innovation, operational efficiency, and digital transformation. As organizations strive for sustained competitiveness, leveraging AI-driven strategies has become a critical factor in optimizing business performance. However, existing research lacks a comprehensive framework that systematically links AI adoption to business competitiveness. This study aims to bridge this gap by developing an AI-driven business competitiveness framework through a systematic literature review. The study covers 831 publications indexed in the Scopus database from 2015 to 2024, ensuring a comprehensive analysis of AI applications in business performance. To identify key themes and research trends, the Latent Dirichlet Allocation (LDA) topic modeling technique was applied, uncovering critical factors such as data-driven performance, business process innovation, supply chain optimization, and firm digitalization. The findings reveal that AI enhances business competitiveness by fostering innovation, improving operational efficiency, and accelerating digital transformation. Specifically, AI-driven strategies optimize business processes, streamline supply chain operations, and enable data-driven decision-making. Additionally, industry performance and firm digitalization serve as mediating factors that reinforce AI's impact on competitiveness. In conclusion, this study highlights AI's strategic role in shaping business performance. The proposed framework provides valuable insights for businesses and policymakers, guiding AI adoption to enhance innovation and efficiency. Future research should explore empirical validation of the framework to further refine AI-driven business strategies in an evolving digital economy.

**Index Terms*— Artificial Intelligence, Latent Dirichlet Allocation, Business Competitiveness, Digital Innovation, Operational Efficiency, AI Framework.***

## I. INTRODUCTION

In recent years, the rapid advancement of Artificial Intelligence (AI) has reshaped industries across the globe [1], creating new opportunities and challenges for businesses aiming to enhance their performance. The proliferation of data, increasing computational power, and advancements in machine learning algorithms have driven the adoption of AI technologies, enabling companies to transform their operations and gain deeper insights into market dynamics [2]. As businesses face an increasingly complex and competitive environment, the need for innovative strategies to maintain and improve performance has become more pressing than ever [3]. This phenomenon has spurred interest in understanding how AI can be leveraged to optimize processes, improve decision-making, and foster innovation within organizations.The integration of AI into business processes offers a powerful mechanism for enhancing performance, especially when combined with the principles of Open Innovation. Byadopting an open innovation framework, businesses can access a broader pool of knowledge, foster collaboration, and accelerate the development of new products and services [4]. In this context, AI plays a pivotal role as an enabler of open innovation, providing advanced analytical tools to identify trends, predict market changes, and facilitate knowledge sharing. The combination of AI and open innovation dynamics allows companies to implement data-driven strategies, enhancing their ability to adapt to shifting market conditions and meet evolving customer demands effectively [5].

Despite the growing body of research on AI and business performance, there remains a gap in understanding the specific ways AI can be strategically applied within an open innovation framework to drive sustainable business growth. While previous studies have examined the impact of AI on operational efficiency or innovation capabilities independently [6], few have explored the intersection of these factors from an integrated perspective that includes the dynamics of open innovation. This study addresses this gap by systematically reviewing the literature to identify key themes and frameworks where AI contributes to enhancing business performance through the lens of open innovation dynamics. The novelty of this research lies in its comprehensive analysis of the synergies between AI, open innovation, and business performance, providing a holistic understanding of how these elements interact to create value. The main contribution of this paper is to synthesize the existing literature on AI and open innovation, identifying critical areas where AI technologies can improve business performance. Furthermore, it proposes a conceptual model that illustrates the role of AI as a catalyst in driving open innovation strategies, helping businesses navigate the challenges of digital transformation and maintain a competitive edge in an increasingly data-driven economy. This research aims to provide valuable insights for academics and practitioners seeking to harness the potential of AI to foster innovation and improve organizational performance in the digital era.The study is designed with an organized structure to introduce the topic comprehensively. Part 2 will provide a literature review on Artificial Intelligence, Business Performance, and Open Innovation Dynamics. Section 3 elucidates the research methods, Section 4 discusses the literature results, and Section 5 deals with the study findings. The conclusions and implications of the study are discussed in Section 6, while the limitations of the study and directions for further research are presented in Section 7. It provides clear guidance for understanding and organizing relevant information in the context of the topics discussed.

## II. LITERATURE REVIEW

The literature review focuses on three critical components that form the foundation of this study: Artificial Intelligence (AI), Business Performance, and Open Innovation Dynamics. This section synthesizes existing research to provide a comprehensive understanding of how these elements intersect and contribute to enhancing business performance in the context of digital transformation and innovation. The literature indicates that the convergence of AI, business performance metrics, and open innovation dynamics creates a powerful framework for enhancing organizational capabilities and sustaining competitive advantage. This study builds on these theoretical foundations to explore how AI can be strategically applied to boost business performance through innovative and collaborative approaches in the modern digital landscape.

### A. *Artificial Intelligence*

Artificial Intelligence (AI) is defined as the capability of machines to mimic human intelligence processes such as learning, reasoning, and self-correction [7]. AI encompasses a wide range of technologies, including machine learning, natural language processing, computer vision, and robotics. In the business context, AI is recognized for its ability to analyze vast amounts of data, generate insights, and make predictions that drive strategic decision-making [8]. The evolution of AI technologies has shifted from rule-based systems to more sophisticated learning algorithms capable of processing unstructured data and adapting to new information autonomously.

The use of AI in businesses is typically categorized intowo primary functions: automation and augmentation. Automation involves the replacement of manual tasks with AI-driven processes, improving efficiency and reducing human error [9]. Augmentation, on the other hand, focuses on enhancing human capabilities by providing tools that aid in decision-making, such as predictive analytics and recommendation systems [10]. The integration of AI into core business processes has been shown to enhance operational efficiency, optimize supply chain management, and enable innovative product development [11]. Furthermore, AI facilitates a data-driven culture within organizations [12], allowing managers to derive actionable insights and create more adaptive strategies in response to market shifts.

### B. *Business Performance*

Business Performance refers to the evaluation of a company's efficiency, effectiveness, and overall success in achieving its objectives [13]. Contemporary frameworks for assessing business performance have expanded to include non-financial metrics, such as customer satisfaction, innovation capability, and operational efficiency [14]. This broader perspective recognizes that sustainable competitive advantage is increasingly derived from intangible assets like knowledge, innovation, and customer relationships [15].

In the context of digital transformation, the application of AI has emerged as a significant driver of enhanced business performance [16], [17]. AI-driven analytics enable businesses to identify patterns, predict market trends, and optimize operational processes, leading to improved efficiency and reduced costs [18]. Moreover, AI tools such as machine learning algorithms and predictive analytics help companies anticipate customer needs and tailor their offerings accordingly, thereby improving customer satisfaction and loyalty [19]. The adoption of AI also supports continuous improvement processes, where companies leverage real-time data to monitor performance and implement changes swiftly [20]. By integrating AI into their performance management systems, firms can develop more dynamic

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages 5872-5878

strategies that align with shifting market demands and enhance their overall competitiveness [21].

## III. METHODS

This study employed a systematic approach to identify, screen, and select relevant literature from the Scopus database, focusing on the intersection of artificial intelligence (AI) and business performance. The methodology consisted of three main stages: identification, screening, and eligibility assessment as shown in Figure 1.The initial identification phase involved a comprehensive search of the Scopus database on November 14, 2024. The search was conducted using specific keywords in the Title, Abstract, and Keywords fields to capture relevant research on business performance and AI. The search query was structured as follows: (TITLE-ABS-KEY (("Business" OR "Organizational" OR "Corporate" OR "Firm") AND ("Performance")) AND TITLE-ABS-KEY ("Artificial Intelligence" OR "AI"))This broad search strategy yielded a total of 5,570 documents. To refine the dataset, the selection was narrowed down to publications from the last 10 years (2015-2024), resulting in 3,567 documents. Further filtering was applied
based on Source Type, selecting only peer-reviewed journal articles and conference proceedings in English, which reduced the number to 2,727 documents. Additionally, a subject area filter was implemented to focus on research within "Business, Management and Accounting" and "Economics, Econometrics and Finance", resulting in a final dataset of 831 documents. These 831 documents formed the basis for subsequent analyses. The study employed Python programming to conduct a country-of-origin analysis and topic modeling [22]. The Latent Dirichlet Allocation (LDA) model was chosen for topic analysis [23], with the optimal number of topics determined using the LDA Model Assessment based on the Coherence Score metric [24].

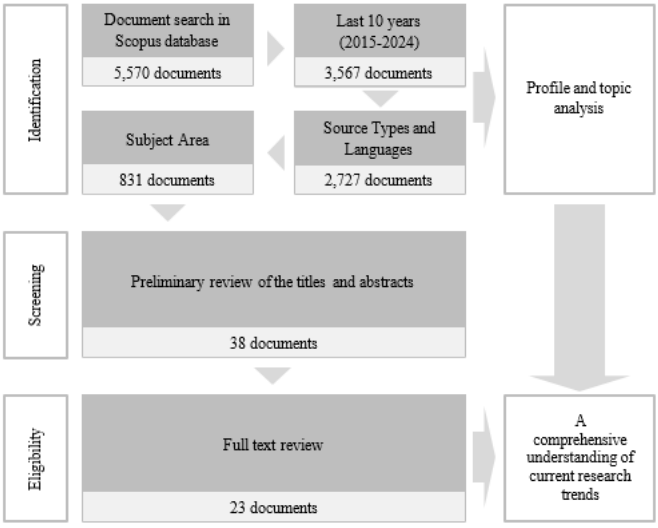



Figure 1: Stages in this research

The screening phase involved a preliminary review of the titles and abstracts of the identified 831 documents to assess their relevance to the research focus. This step aimed to exclude studies that did not meet the inclusion criteria based on their content, without proceeding to a full-text review. The goal was to quickly filter out irrelevant papers that were unlikely to contribute to the study's objectives. As a result of this process, the number of documents was reduced to 38.

The final stage was the full-text eligibility review, where the remaining 38 articles underwent a detailed evaluation based on predefined inclusion and exclusion criteria. The purpose of this thorough review was to ensure that the selected studies were methodologically sound and directly relevant to the research question, which explores the use of AI in enhancing business performance. Common reasons for exclusion at this stage included lack of alignment with the research topic, insufficient methodological rigor, or incomplete data. This rigorous assessment resulted in a final selection of 23 documents.

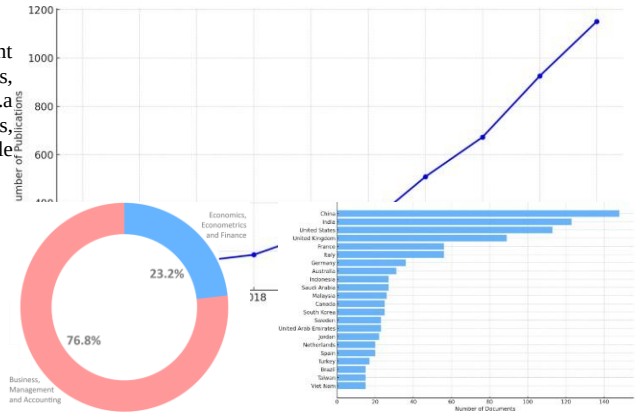
These selected documents were then analyzed in detail, and the findings were integrated into the discussion section of the research [25]. The analysis connected these selected papers with the insights gained from the topic modeling, providing a comprehensive understanding of current research trends in the application of AI for improving business performance within the framework of open innovation dynamics.

## IV. RESULTS

In the past decade, there has been a substantial increase inresearch exploring the relationship between business performance and the use of Artificial Intelligence (AI). Based on a search in the Scopus database, 5,570 documents were identified that matched criteria combining the terms "Business," "Organizational," "Corporate," or "Firm" with "Performance," as well as "Artificial Intelligence" or "AI." The number of publications in the last 10 years as shown in Figure 2 shows a consistent growth trend in the literature related to the application of AI to improve business performance in various contexts. In particular, 2024 saw the highest number of publications with 1,151 documents, indicating a sharp rise in interest within the last year alone. This is followed by 925 documents in 2023 and 672 in 2022. The marked increase in publications began in 2019, with 268 documents, followed by 311 documents in 2020, and continued to rise significantly in subsequent years. Before 2019, the volume of publications on this topic was relatively lower, with 185 documents in 2018, 157 in 2017, and only 138 in 2016. These years reflect an early period of interest in the connection between AI and business performance before the exponential growth of publications over the past five years. The surge in the number of publications demonstrates that AI is increasingly recognized as a critical component in strategies aimed at improving business and organizational performance. This growth in research is likely driven by advancements in AI technology, the increased availability of data, and more powerful computing resources that allow for broader application of AI across industries.

Figure 2: Number of Publications on Business Performance and AI (2015-2024)

Based on the source filters ("Journal" and "Conference Proceeding") and relevant subject areas ("Business, Management and Accounting" and "Economics, Econometrics and Finance"), a total of 831 documents were identified. Figure 3.a illustrates that the majority of the studies are from the field of "Business, Management and Accounting," accounting for 755 documents (76.8%), while "Economics, Econometrics and Finance" contributes 228 documents (23.2%).




(a) Documents by Subject Area (b) Documents by Country/Territory

Figure 3: Distribution of Documents

In terms of geographical distribution, as shown in Figure 3.b, most publications originate from China (148 documents), India (123 documents), and the United States (113 documents), indicating the dominance of major countries in AI research and development within a business context. European countries such as the United Kingdom, France, and Italy also make significant contributions to this body of literature. This distribution highlights global trends in AI- driven business performance research, with a primary concentration in countries with advanced research ecosystems and greater access to technology.

Using the Latent Dirichlet Allocation (LDA) model, an analysis was conducted on the titles, abstracts, and keywords of 831 manuscripts obtained from the Scopus database. This analysis identified seven main topics with a Coherence Score of 0.32775359239432017, indicating a moderate level of topic clarity. Although there

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages 5872-5878

is some overlap between topics, the results suggest significant variation in the application of AI to enhance performance across different business contexts. The key terms and their corresponding weights for each topic are summarized in Table 1.

Table 1: Identified Topics and Key Terms from LDA Analysis

| Topic | Topic | Key Terms | Term Weights |
|---|---|---|---|
| Topic 1 | Data-Driven Performance Innovation | Performance, Data, Business, Model, Research, Intelligence, Study, Management, Artificial, Innovation | 0.014, 0.009, 0.009, 0.008, 0.007, 0.007, 0.007, 0.006, 0.006, 0.006 |
| Topic 2 | Supply Chain Innovation | Performance, Intelligence, Research, Artificial, Study, Firm, Management, Chain, Supply, Innovation | 0.016, 0.013, 0.013, 0.013, 0.013, 0.010, 0.009, 0.008, 0.008, 0.008 |
| Topic 3 | Business Processes Innovation | Study, Performance, Data, Business, Technology, Intelligence, Process, Learning, Artificial, Innovation | 0.015, 0.012, 0.012, 0.010, 0.009, 0.009, 0.009, 0.009, 0.007, 0.007 |
| Topic 4 | Industry Performance | Performance, Study, Data, Management, Research, Intelligence, Artificial, Technology, Industry, Business | 0.015, 0.013, 0.012, 0.010, 0.009, 0.009, 0.009, 0.009, 0.006, 0.006 |
| Topic 5 | Firm Digitalization | Performance, Technology, Digital, Business, Study, Artificial, Research, Firm, Intelligence, Analysis | 0.020, 0.014, 0.011, 0.009, 0.009, 0.008, 0.008, 0.007, 0.007, 0.006 |
| Topic 6 | Optimizing processes and efficiency | Performance, Intelligence, Data, Model, Artificial, Study, Business, Technology, Firm, Organizational | 0.016, 0.011, 0.008, 0.008, 0.008, 0.008, 0.007, 0.007, 0.007, 0.006 |
| Topic 7 | Business Strategy Drivers | Intelligence, Performance, Artificial, Business, Model, Technology, Study, Firm, Data, Research | 0.022, 0.015, 0.012, 0.012, 0.011, 0.010, 0.010, 0.009, 0.007, 0.007 |

Each theme or topic encapsulates a distinct aspect of AI's role in enhancing business and organizational performance. Topic 1 highlights the intersection of performance, data, and innovation within business contexts. The frequent occurrence of terms like model, research, and management suggests a focus on leveraging data-driven approaches and AI models to foster innovative strategies and improve management practices. Topic 2 emphasizes the application of AI in supply chain optimization and its contribution to firm performance. Keywords such as chain, supply, and management indicate a focus on enhancing operational efficiency and innovation through intelligent supply chain practices. Topic 3 centers on the integration of AI technologies into business processes and organizational learning. The recurring keywords, including technology, process, and learning, suggest a focus on transforming traditional business workflows through technological advancements.

Topic 4 reflects the role of AI and technology in driving industry-level performance improvements. Keywords like industry, management, and research highlight an emphasis on technological adoption to enhance competitive advantage and organizational outcomes. Moving on, with terms like digital, technology, analysis, and firm, topic 5 explores the impact of digitalization on organizational performance. It underscores the growing importance of analytics and AI technologies in evaluating and improving firm performance metrics. Topic 6 captures the application of AI models to streamline organizational efficiency. Keywords like organizational, firm, and technology indicate a focus on AI's role in optimizing internal processes and aligning them with strategic goals. Lastly, topic 7 portrays AI as a key driver for strategic decision-making and innovation in business contexts. Keywords such as business, model, and intelligence suggest a focus on using AI to develop business models that enhance competitiveness and performance.

The Intertopic Distance Map generated from the LDA model as shown in Figure 4 provides a visual representation of the thematic landscape in research related to business performance using artificial intelligence (AI), with an emphasis on open innovation dynamics. It highlights how businesses are increasingly adopting AI technologies as part of their open innovation strategies, integrating external innovations to optimize processes, develop new capabilities, and maintain a competitive advantage in rapidly evolving markets. Each circle in the map represents one of the seven topics identified, with the size of the circle indicating the prevalence or weight of that topic across the 831 manuscripts analyzed. The distance between circles reflects their semantic similarity: closer circles indicate topics with overlapping themes, while more distant ones represent distinct research areas.

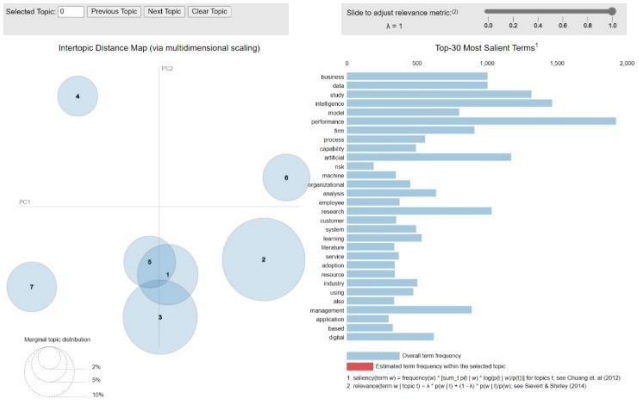



Figure 4: Intertopic Distance Map of AI-Driven Business Performance

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
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From the visualization, several key patterns emerge. Topics 1, 3, and 5 are positioned closely together, suggesting a strong thematic connection related to foundational aspects of business performance, such as the implementation of AI models, data-driven decision-making, and management strategies. This clustering highlights the central role of AI in
optimizing traditional business processes and enhancing efficiency. It indicates a shared focus on leveraging AI technologies to improve overall performance metrics by integrating advanced data analytics, predictive modeling, and machine learning techniques into organizational practices. On the other hand, topics such as 2, 4, 6, and 7 are more dispersed, reflecting unique areas of research focus within the broader theme of business performance. For example, Topic 2, situated further away from the core cluster, is likely centered around specific applications of AI in supply chain optimization and process innovation. Meanwhile, Topic 4 appears to emphasize digital transformation, focusing on how businesses adopt digital technologies and AI to modernize operations and enhance performance. Topics 6 and 7 represent specialized areas, possibly exploring AI model development and the integration of AI-driven solutions in niche business contexts, aligning with open innovation principles.

The right panel of the visualization shows the top 30 most salient terms across all topics, with high-frequency keywords such as "business," "data," "intelligence," "model," and "performance." These terms underscore the core themes of using AI to drive business improvements. The presence of words like "innovation," "learning," "capability," and "adoption" further reflects the dynamics of open innovation, where companies actively seek new technological solutions and external knowledge to enhance their competitive edge and adapt to changing market conditions.

Based on an in-depth analysis of 23 selected documents in this research literature, we found 4 main aspects of the role of AI in business, namely Innovation Dynamics, Operational Efficiency, Digital Transformation, and Business Competitiveness. All selected documents, aspect categories and mapping of the seven topics are presented in Table 2.

Table 2. Selected document analysis summary

| No | Author | Findings | Aspect | Topic |
|---|---|---|---|---|
| 1. | [26] | Innovation in the integration of big data, cloud computing, AI, and digital platforms into business processes optimizes business strategies and increases competitiveness. | Innovation | Data-Driven Performance Innovation |
| 2 | [27] | Data-driven technological innovation, AI-driven businesses will automate services. | Innovation | Data-Driven Performance Innovation |
| 3 | [28] | AI impacts data-driven business processes that drive business decisions. | Innovation | Data-Driven Performance Innovation |
| 4 | [29] | The application of digital technologies such as data- driven AI improves the sustainability performance of organizations with product and process innovation. | Innovation | Data-Driven Performance Innovation |
| 5 | [12] | The impact of data-driven AI on the innovation process can reduce the burden of technical tasks on managers, and allow focus on developing innovation strategies, which changes the way companies manage innovation. | Innovation | Data-Driven Performance Innovation |
| 6 | [30] | Knowledge on innovation, AI implementation and competitiveness enhance firm performance. | Innovation | Business Processes Innovation |
| 7 | [31] | Artificial intelligence in innovation opens up wider market opportunities. | Innovation | Business Processes Innovation |
| 8 | [32] | AI-facilitated knowledge digitization improves corporate performance through business model innovation | Innovation | Business Processes Innovation |
| 9 | [33] | AI Integration Factors and innovation culture have influenced the adoption of e- commerce which improves the | Innovation | Business Processes Innovation |
| | | marketing performance of SMEs. | | |
| 10 | [34] | The ability to innovate with AI generates valuable progress and opportunities for startups. | Innovation | Business Processes Innovation |
| 11 | [35] | AI-based dynamic capabilities and innovations influence circular supply chains, contributing to sustainable performance improvements in the retail sector. | Innovation | Supply Chain Innovation |
| 12 | [36] | The collaboration of AI and supply chain management innovation increases the revenue of companies that adopt automation. | Innovation | Supply Chain Innovation |
| 13 | [11] | AI positively influences digital supply chain performance moderated by innovation. | Operational Efficiency | Supply Chain Innovation |
| 14 | [37] | Digital innovations such as AI and augmented reality automate logistics and supply chain systems, which increases efficiency, improving manufacturing performance. | Operational Efficiency | Supply Chain Innovation |
| 15 | [38] | AI is an innovative solution to enhance business relationships and support vertical alliances across the value chain between buyers and suppliers. | Operational Efficiency | Supply Chain Innovation |
| 16 | [6] | Adopting AI enhances an organization's ability to innovate, resulting in more accurate decisions and operational efficiency. | Operational Efficiency | Optimizing processes and efficiency |
| 17 | [39] | AI-based industrial robots enhance innovation, supporting technological transformation for increased production efficiency. | Digital Transformati on | Industry Performance |
| 18 | [40] | AI has the potential to drive agility and innovation in project management, replacing human roles, offering critical insights into digital transformation. | Digital Transformati on | Industry Performance |
| 19 | [41] | Digitalization of supply chain integration in manufacturing companies contributes to digitalized delivery performance. | Digital Transformati on | Firm Digitalization |
| 20 | [42] | The application of AI and other technologies, such as the development of corporate digital finance, provides digitally transformed companies with the tools to help provide a valuable policy basis. | Digital Transformati on | Firm Digitalization |
| 21 | [43] | Digital intelligence transformation impacts company performance. | Digital Transformati on | Firm Digitalization |
| 22 | [44] | AI is becoming an important tool in planning better business strategies, the use of Machine Learning predicts the success of online platforms before launching to the market. | Business Competitive ness | Business Strategy Drivers |
| 23 | [45] | Integration of digital recommendation models into intelligent service systems as part of an e-business or digital strategy to enhance the tourist experience. | Business Competitive ness | Business Strategy Drivers |

Through Innovation Dynamics, AI drives innovation dynamics by creating flexible, creative and responsive workflows to modern business challenges. The second aspect of the role of AI in business is Operational Efficiency, namely more efficient operational processes enable cost and time savings, which strengthens the

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
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company's ability to achieve optimal results. Furthermore, AI-based Digital Transformation enables fundamental changes in the way companies operate, increasing their adaptability and agility. And finally, Business Competitiveness, all of these benefits collectively increase business competitiveness, ensuring sustainability in an increasingly competitive global market.

## V. DISCUSSION

The results of this study indicate that the implementation of Artificial Intelligence (AI) has become an integral component in enhancing business performance through innovation dynamics and digital transformation. The findings suggest that the integration of AI in business functions not only as a tool to improve operational efficiency but also as a key driver of innovation and digital transformation. By synthesizing the seven identified topics and four aspects, this research proposes a framework, as illustrated in Figure 5, where AI acts as a catalyst across various business dimensions to achieve sustainable competitiveness. The Innovation Dynamics aspect, with topics 1, 2, and 3, highlights the potential of AI to drive innovation by leveraging data analytics and predictive models, enabling organizations to stay ahead in competitive markets. Furthermore, the Operational Efficiency aspect with topics 2 and 6 highlights how AI optimizes supply chains and internal processes, reduces costs, and increases agility. The Digital Transformation aspect, based on topics 5 and 4, emphasizes the critical role of digital technology and AI in transforming traditional industries, in line with the global push for digitalization and sustainability. As for the Business Competitiveness aspect, especially topic 7, this also applies to all topics, the use of AI for performance improvement and strategic insights positions businesses to respond effectively to market challenges and opportunities.

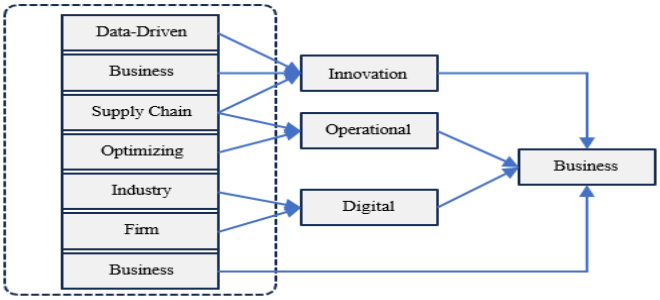


Figure 5: AI Framework Shaping Business Performance

### A. *Innovation Dynamics*

In the context of enhancing business performance through Open Innovation Dynamics, the use of Artificial Intelligence (AI) plays a significant role in accelerating innovation processes and creating more adaptive innovation dynamics. Innovation Dynamics in the digital era encompasses not only the development of new products or services but also the comprehensive transformation of business processes and supply chains. Key aspects such as data analytics, supply chain management, and an innovation-driven culture play a major role in achieving sustainable competitive advantages.

Big data analytics and effective data management capabilities enable companies to identify innovation opportunities that were previously difficult to detect. Big data analytics acts as a mediator in enhancing innovation capacity and technology management [26]. This is crucial as data analytics allows companies to optimize their technology portfolios and guide more accurate and faster data-driven decision-making processes. Integrating big data analytics into the innovation process helps companies understand dynamic market needs and identify new trends that support the development of innovative products and services. The success of digital transformation is highly dependent on an organizational culture that is data-driven [29]. Such a culture enables companies to utilize AI to automate business processes and improve operational efficiency, positively impacting product and process innovation, thereby enhancing operational performance and corporate sustainability.

In the realm of supply chain innovation, AI plays a pivotal role in improving visibility and workflow efficiency. AI is used to monitor and optimize supply chain operations in real- time, reducing risks and increasing supply chain resilience. The integration of AI with the Internet of Things (IoT) in AI- based fintech creates more sophisticated analytical capabilities, enabling companies to improve operational efficiency and reduce transaction costs [27]. This innovation opens opportunities to enhance supply chain performance by utilizing analytics algorithms to predict potential disruptions and optimize resource distribution more effectively. SMEs demonstrate that adopting AI in e-commerce and supply chains allows companies to respond more quickly to changes in market demand [33]. Implementing AI facilitates automation in inventory management, shipment tracking, and customer demand forecasting, which collectively improves marketing performance and operational efficiency for small and medium-sized enterprises.

The digital transformation driven by AI has revolutionized how companies manage and develop their business processes. AI not only supports data-driven business processes but also aids in more effective decision-making through advanced predictive algorithms [28]. This enables organizations to automate routine tasks while accelerating strategic decision- making processes, integrating both operational and strategic levels of the company. In this regard, AI acts as an innovation driver that strengthens digital leadership, where digital leadership collaborates with AI technologies to drive broader business innovation [46]. Additionally, in the context of startups, AI significantly impacts the enhancement of innovation capabilities and technology management [34]. AI helps to strengthen organizational structures and supports more efficient ideation processes, enabling startups to be more adaptive and innovative in navigating rapidly changing market dynamics. The use of AI in managing digital knowledge allows companies to transform knowledge into tangible competitive advantages through sustainable business model innovation.

The use of AI in innovation further enhances the overall competitiveness of companies. As discussed by Correia & Matos [12], AI facilitates innovation management processes by automating time-consuming tasks, allowing managers to focus more on strategic activities requiring creativity. AI also expands management capabilities to access and analyze large-scale data, which in turn drives the development of better and data-driven innovation strategies. A study by Spanjol et al. [31] explains that future innovation trends will be heavily influenced by the integration of AI into innovation management, particularly in creating responsible innovation. AI enables companies to adopt a more proactive approach to managing innovation by considering social and environmental impacts, resulting in products and services that are not only innovative but also sustainable.

### B. *Operational Efficiency*

With the implementation of AI technology, companies can enhance operational efficiency through several key approaches, including process automation, real-time data analysis, and the reduction of human errors. A study by Al- khatib et al. [11] highlights that AI has a significant impact on Digital Supply Chain Performance (DSCP). In this context, AI capabilities support ambidextrous innovation (i.e., exploratory and exploitative innovation), which in turn improves supply chain management efficiency. AI facilitates better data analysis and enables companies to predict production needs based on historical data and current market demand. This not only enhances efficiency but also reduces risks associated with supply chain uncertainties. Gupta & Jauhar [37] emphasize the importance of digital innovation, along with other technologies such as cloud computing and cyber-physical systems, in contributing to the automation of logistics and supply chain systems, thereby accelerating production and distribution processes. AI implementation allows companies to monitor in real time, predict disruptions in production, and optimize resource allocation. In the long term, this enhances operational efficiency and reduces production costs while enabling companies to respond more effectively to changes in market demand. Similarly, in the healthcare sector, AI helps reduce information asymmetry between buyers and suppliers [38], where AI provides more transparent access to information regarding prices, available stock, and real-time delivery status. This reduces the risk of communication failures

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages 5872-5878

and improves operational efficiency in buyer-supplier relationships. It also enables better collaboration and enhances operational flexibility through stronger vertical alliances within the value chain.

The adoption of AI in high-tech companies significantly improves operational efficiency by optimizing decision- making processes [6]. AI supports deeper data analysis and more precise decision-making, reducing the time required for critical decisions and minimizing the likelihood of human errors. In their study, companies leveraging AI were able to produce faster and more accurate decisions, directly improving productivity and operational performance. AI also plays a crucial role in automating routine tasks that typically consume significant time and human resources. By utilizing AI, companies can automate various tasks such as inventory management, production planning, and customer service. This automation allows organizations to redirect human resources toward more strategic and creative tasks, ultimately contributing to sustainable innovation and higher operational efficiency [37]. Meanwhile, AI implementation also aids in identifying and mitigating operational risks. For instance, in a study by Cannavale et al. [38] in the healthcare sector, AI was used to analyze data from various sources to detect potential disruptions in the supply chain before they occurred. With this early detection, companies can adopt more proactive mitigation measures, avoid potential losses, and enhance operational continuity.

### C. *Digital Transformation*

In the aspect of Digital Transformation, Artificial Intelligence (AI) has become a key element driving companies toward enhanced performance through more advanced and structured digitalization. The integration of AIinto digital transformation processes enables companies to adopt new data-driven technologies, automate operations, and manage resources more efficiently. A tangible example is the application of AI in enhancing corporate green innovation, utilizing industrial robots to create more efficient and environmentally friendly production environments. The use of industrial robots not only improves the quality of green innovation but also scales it up by optimizing energy usage and strengthening environmental management [39]. This underscores AI's role in driving green technological transformation, contributing to sustainability and operational efficiency in the manufacturing sector. AI also plays a crucial role in entrepreneurial project management, particularly in enhancing organizational agility and innovation. Integrating AI into project management reduces dependency on human involvement in routine operational processes, allowing companies to focus on strategic decision-making [40]. AI provides real-time data analytics that helps project managers identify risks and opportunities more quickly, thereby improving organizational responsiveness to market changes. This AI-supported digital transformation leads to a more dynamic business environment where decision-making processes can be executed with greater accuracy and efficiency.

In the context of the supply chain, AI-driven digital transformation has had a positive impact on supply chain integration and performance. Digital resource management through hybrid governance, which combines internal development and outsourcing to leverage technologies such as AI and cloud computing, enables companies to enhance their supply chain integration. This approach optimizes delivery performance and reduces dependency on external resources [41].

Meanwhile, the establishment of Free Trade Zones (FTZs) in China has facilitated digital transformation for companies by creating a more conducive environment for AI technology adoption [42]. FTZs enhance corporate performance by reducing uncertainty in economic policies and strengthening internal innovation through the adoption of digital technologies such as big data and cloud computing. This digitalization not only improves corporate competitiveness but also contributes to sustainability efforts by reducing carbon emissions through more efficient operations. This reflects how structural support and external policies can accelerate AI-driven digital transformation.

A well-planned strategy for implementing AI-based intelligent digital transformation is essential, as the effectiveness of digital transformation is influenced by process characteristics such as speed and implementation rhythm [43]. A fast and orderly process can strengthen the relationship between digital transformation and improved corporate performance, while an overly broad scope may diminish the expected positive impact.

### D. *Business Competitiveness*

In the aspect of Business Competitiveness, AI plays an increasingly important role as a key driver in the development of Business Strategy Drivers. The implementation of AI enables companies to create data-driven strategies that provide deep insights into market performance and consumer behavior. AI-driven Business Strategy Drivers include data

analysis, resource optimization, and strategic decision- making improvements that allow companies to respond to market changes swiftly and accurately. AI facilitates the identification of new business opportunities, risk reduction, and strengthening of competitive positions in the market through more adaptive and efficient strategies.

Machine Learning (ML), a subset of AI, can be utilized to predict the success of digital products, such as online platforms in the financial services sector. ML is applied to Key Performance Indicators (KPIs) developed using the Balanced Scorecard (BSC) approach to analyze customer perspectives. This allows companies to take preventive measures against potential business failures and respond with more adaptive strategies to shifts in market dynamics [44].

The use of AI in the context of smart tourism can drive business strategies in the tourism sector through intelligent recommendation systems. These systems optimize urban tourism recommendations using more advanced Machine Learning algorithms [45]. The proposed model, which combines swarm optimization algorithms and differential evolution, delivers more personalized and user-preference- aligned recommendations compared to previous methods. The implementation of AI in recommendation systems strengthens e-commerce and digital business strategies by significantly enhancing customer experiences. The use of AI- based algorithms for analyzing user preferences and selecting optimal transportation modes also bolsters business competitiveness in the tourism industry. This enables service providers to offer richer and more responsive experiences tailored to the needs of individual travelers. This demonstrates that AI not only simplifies data analysis but also becomes a critical element in shaping business strategies to achieve differentiation and excellence in competitive markets [45].

As a Business Strategy Driver, AI offers significant benefits in enhancing Business Competitiveness. This technology allows companies to analyze data in real-time and identify hidden patterns, aiding in the creation of more resilient and adaptive strategies. By leveraging AI, companies can accelerate innovation processes, optimize resource allocation, and strengthen customer relationships. In the context of open innovation, AI also opens up new collaboration opportunities, enabling companies to leverage external resources and innovative ideas to create sustainable competitive advantages.

## VI. CONCLUSION

This study highlights the transformative role of Artificial Intelligence (AI) in enhancing business performance, particularly through the lens of open innovation dynamics. By analyzing documents sourced from the Scopus database and focusing on four core aspects—Innovation Dynamics, Operational Efficiency, Digital Transformation, and Business Competitiveness—this research provides a comprehensive framework illustrating how AI is leveraged across various business contexts. The findings reveal that AI is a catalyst for driving innovation by enabling data-driven decision-making and predictive analytics. It helps companies streamline their processes, increase operational efficiency, and enhance their agility in response to changing market dynamics. The integration of AI in digital transformation initiatives further

supports the adoption of advanced technologies and contributes to the overall competitiveness of firms by optimizing their strategic approaches.

Moreover, the role of AI as a Business Strategy Driver is evident in its ability to provide deep insights into market performance and consumer behavior, empowering businesses to make informed, data-driven decisions. Through the use of predictive models and real-time analytics, companies can identify new opportunities, mitigate risks, and build sustainable competitive advantages. The study suggests that AI's integration within open innovation frameworks enhances collaborative efforts, allowing firms to harness external knowledge and innovative ideas effectively. This strategic use of AI not only supports continuous improvement but also positions businesses to navigate the complexities of a rapidly evolving digital landscape, ensuring long-term success and market relevance.

## VII. LIMITATIONS AND FURTHER RESEARCH

This study has several limitations, particularly in the scope of the systematic literature review, which was restricted to publications indexed in the Scopus database. This may have excluded relevant studies from other databases, potentially limiting the comprehensiveness of the findings. Additionally, the focus on two specific subject areas could restrict the generalizability of the results, as AI applications in business may differ across other disciplines and regions.

Future research should expand the analysis to include a broader range of databases and consider studies from various subject areas, including multilingual research, to capture diverse perspectives on AI's role in enhancing business performance. Empirical studies could further explore specific industry contexts to validate the proposed framework, examining how factors like organizational culture and external market conditions influence the adoption and impact of AI-driven innovations. Moreover, future research could investigate the long-term effects of AI on business sustainability and its strategic role in shaping future business models within

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages 5872-5878

the open innovation paradigm. This would provide deeper insights into how AI contributes to sustainable growth and competitive advantage in various market environments.

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