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THE ROLE OF ARTIFICIAL INTELLIGENCE IN IMPROVING SUPPLY CHAIN PERFORMANCE AND EFFICIENCY: AN ANALYTICAL STUDY OF PALESTINIAN COMPANIES

Raneen Abedalnaser Tahhan[1,a*], Sumaiyah Binti Abd Aziz[2,b] and Jamal Abdul Nassir Bin Shaari[3,c]

[1,2,3]*Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia, Nilai, Negeri Sembilan, Malaysia*
[a] *raneentahhan90@gmail.com*
[b] *sumaiyah@usim.edu.my*
[c] *jamal@usim.edu.my*

*Corresponding Author: *raneentahhan90@gmail.com*

Abstract**:** *The rapid development of digital transformation technologies has accelerated the adoption of artificial intelligence (AI) as a strategic tool for improving supply chain management and enhancing performance and efficiency. This study aims to analyze the role of AI in improving supply chain performance and efficiency through an analytical review of scientific research published between 2020 and 2026. The review focuses on AI applications in key supply chain areas, including demand forecasting, inventory management, production planning, logistics, risk management, and sustainability. The study adopts an analytical approach based on content analysis of peer-reviewed research published in leading international academic databases. The reviewed literature suggests that AI applications have the potential to enhance demand forecasting accuracy, reduce operational costs, improve inventory management, strengthen supply chain resilience, and support more effective decision-making. The review also highlights several challenges that may hinder the widespread adoption of AI technologies, including high implementation costs, data quality issues, cybersecurity concerns, shortage of qualified personnel, and organizational resistance to change. In the Palestinian context, AI may represent a valuable opportunity to enhance organizational efficiency and improve business competitiveness. However, realizing the potential benefits of AI requires developing digital infrastructure, investing in human capital, and fostering a culture of digital transformation. The study highlights that artificial intelligence represents an important strategic enabler for developing smarter, more resilient, and more sustainable supply chains, particularly in emerging and resource-constrained economies*

Keywords: Artificial intelligence, supply chain management, supply chain performance, digital transformation, predictive analytics.

1. Introduction

Supply chain management has become one of the most important strategic functions supporting the success of modern organizations. It plays a central role in coordinating the flow of materials, information, products, and services across the entire supply chain, connecting suppliers to end customers in an integrated manner. Contemporary supply chain management goes beyond traditional operational activities such as transportation, warehousing, and inventory control, representing a comprehensive management approach

aimed at improving operational efficiency, reducing costs, enhancing service quality, and enabling organizations to respond effectively to rapidly changing market conditions (Christopher, 2016). In today's business environment, characterized by increasing uncertainty and intense competition, the ability to develop efficient, resilient, and robust supply chains has become a critical factor in an organization's competitiveness and long-term sustainability (Ivanov & Dolgui, 2021).

The strategic importance of supply chain management is most evident in the Palestinian economy, where business operations are shaped by a unique combination of economic, political, and logistical constraints. Palestinian businesses operate in an environment characterized by limited resources, heavy reliance on imported goods, high transportation and logistics costs, and persistent challenges affecting the movement of products across local and international markets. These conditions have significantly hampered the ability of businesses, particularly small and medium-sized enterprises (SMEs), to manage their supply chain activities efficiently and respond quickly to fluctuations in market supply and demand. Consequently, there is a growing need for organizations to adopt modern management approaches and advanced technologies that enhance planning capabilities, mitigate operational risks, and improve overall supply chain resilience (World Bank, 2024).

In this context, digital transformation has emerged as a key driver of organizational change, fundamentally reshaping how businesses operate and compete. Organizations are increasingly integrating digital technologies into their core operations to improve operational efficiency, support data-driven decision-making, and enhance organizational performance. Among these technologies, artificial intelligence (AI) has become one of the most impactful innovations of the Fourth Industrial Revolution. Through its capabilities in data analysis, machine learning, predictive modeling, and intelligent automation, AI enables organizations to optimize their business processes, improve the quality of their decisions, and develop more efficient and agile operating models (Davenport & Ronanki, 2018).

AI has also garnered increasing attention in supply chain management due to its ability to enhance decision-making and improve operational performance. AI-powered applications are increasingly used across various supply chain functions, including demand forecasting, inventory management, procurement optimization, supplier selection, production planning, and logistics route optimization. By processing and analyzing massive amounts of data, these technologies enable organizations to extract actionable insights that support faster and more accurate decision-making. As a result, artificial intelligence contributes to reducing operating costs, improving service quality, and enhancing overall supply chain performance (Min, 2010; Baryannis et al., 2019).

Therefore, this study aims to analyze the role of AI in enhancing the performance and efficiency of supply chains in Palestinian companies. Specifically, it explores how AI technologies contribute to improving operational processes, enhancing planning and decision-making capabilities, and addressing the challenges associated with supply chain management. Through this, the study aims to address the existing research gap by providing a comprehensive understanding of AI applications, opportunities, and challenges related to supply chain performance in the Palestinian context.

To achieve this objective, the study addresses the following research questions:

1. What is the role of artificial intelligence applications in improving supply chain performance and efficiency based on the reviewed literature?
2. How do artificial intelligence applications contribute to improving supply chain performance and efficiency according to previous studies?

3. Which AI applications have the greatest impact on enhancing supply chain processes?
4. What are the most significant challenges facing Palestinian companies in adopting AI technologies?

The significance of this study lies in its theoretical and practical contributions. Theoretically, the study contributes to the growing body of literature on the relationship between artificial intelligence and supply chain management, particularly within the Palestinian economic context, which has received limited attention in previous research. Practically, the study provides insights derived from existing literature that may support Palestinian companies and policymakers in understanding the potential benefits and challenges associated with AI adoption and developing appropriate digital transformation strategies. These efforts can contribute to improving supply chain efficiency, enhancing organizational competitiveness, and supporting the sustainability of operational processes.

2. Theoretical Framework

2.1 Concept of Artificial Intelligence (AI)

Artificial intelligence (AI) is one of the most significant technological advancements of the modern era and has become a key driver of digital transformation and the redesign of administrative and operational processes across various organizations. AI has evolved from a specialized field within computer science into a strategic technology that organizations increasingly adopt to improve performance, enhance operational efficiency, and support managerial decision-making. AI is commonly defined as a set of computer systems capable of simulating certain human cognitive abilities, including learning, reasoning, problem-solving, planning, and decision-making through the use of algorithms and data (Russell & Norvig, 2021).

AI encompasses a range of advanced technologies, including machine learning, deep learning, artificial neural networks, natural language processing, and big data analytics. According to previous studies, these technologies enable intelligent systems to learn from historical data, identify patterns and hidden relationships, and generate predictive insights that support more informed and effective organizational decision-making (Jordan & Mitchell, 2015).

The literature indicates that the rapid advancement of information and communication technologies has accelerated the adoption of AI across organizations as an important tool for improving operational performance. Rather than relying solely on human expertise for planning and decision-making, organizations increasingly utilize intelligent systems capable of providing accurate, real-time data analysis. These capabilities are associated with process improvement, error reduction, and greater responsiveness to changes in the business environment (Davenport & Ronanki, 2018).

Within the context of supply chain management, previous studies suggest that artificial intelligence represents a significant shift from traditional reactive management approaches toward more proactive, predictive, and data-driven practices. The literature highlights that AI technologies can support demand forecasting, inventory optimization, supplier evaluation, transportation planning, and distribution management, thereby contributing to more resilient, responsive, and efficient supply chains (Baryannis et al., 2019).

Artificial Intelligence in the Palestinian Context

The application of artificial intelligence (AI) has gained increasing attention in the Palestinian context due to the unique challenges faced by Palestinian companies. According to the reviewed literature, Palestinian companies operate in an environment characterized by limited resources, difficult market access, reliance on external suppliers, and various infrastructural, economic, and political constraints. These conditions highlight the potential importance of AI applications in supporting resource optimization, enhancing operational planning, and reducing supply chain risks (World Bank, 2024).

The reviewed studies suggest that AI applications could support Palestinian companies by improving demand forecasting, optimizing inventory management, enhancing production planning, and assisting procurement and transportation decision-making processes. The literature also indicates that AI may help small and medium-sized enterprises (SMEs) improve their competitiveness by enabling them to utilize available data more effectively and generate insights that support planning and managerial decision-making.

However, the reviewed literature also highlights several challenges that may limit AI adoption in Palestinian companies. These include limited investment in advanced technologies, inadequate digital infrastructure, a shortage of specialized human resources, high implementation costs, and insufficient integration among existing digital systems. Therefore, the literature suggests that successful AI adoption requires clear digital transformation strategies, investment in human capital development, and stronger collaboration between the private sector, universities, and technology-related institutions (Belhadi et al., 2024).

2.2 Concept of Supply Chain Management (SCM)

Supply chain management (SCM) is a modern management field that has gained increasing attention due to the changing nature of competition among organizations. The reviewed literature suggests that competition in contemporary markets is no longer based solely on an organization's ability to produce high-quality products but increasingly depends on its ability to efficiently manage the entire supply chain, from sourcing raw materials to delivering the final product to customers (Christopher, 2016).

Mentzer et al. (2001) define supply chain management as the systematic coordination and integration of the various activities and entities involved in the flow of products, services, information, and financial resources, with the aim of creating greater customer value and improving overall supply chain performance. Similarly, Christopher (2016) describes the supply chain as an interconnected network of organizations that collaboratively manage the flow of products and information while balancing operational costs and service levels.

According to the reviewed literature, supply chain management encompasses a wide range of activities, including supplier relationship management, procurement and sourcing, production planning, inventory management, transportation and distribution, and customer relationship management.

The reviewed studies also indicate that information has become a critical resource for effective supply chain management. The efficient exchange of accurate and timely information among supply chain partners enhances coordination, supports decision-making, and reduces operational uncertainty. Consequently, the literature identifies digital

technologies and artificial intelligence as important enablers for improving supply chain management practices and supporting supply chain performance (Christopher, 2016; Baryannis et al., 2019).

Supply Chain Management in Palestinian Companies

The reviewed literature indicates that Palestinian companies face unique challenges in managing their supply chains compared with many other economic contexts. According to previous studies, many Palestinian companies rely heavily on external suppliers, making procurement, inventory management, and transportation activities more vulnerable to external disruptions. The literature also highlights that rising logistics costs and difficulties in predicting market fluctuations increase the need for more flexible and adaptive supply chain management approaches (World Bank, 2024; UNCTAD, 2025).

The reviewed studies further suggest that modern technologies, particularly artificial intelligence (AI), have the potential to support Palestinian companies in improving supply chain management. AI applications may contribute to enhancing demand forecasting, strengthening operational decision-making, improving resource utilization, and reducing the impact of uncertainty and disruptions within the business environment (Pournader et al., 2021; Belhadi et al., 2024).

Palestinian companies face unique challenges in managing their supply chains compared to many other economic contexts. Many companies rely heavily on external suppliers, making procurement, inventory, and transportation more vulnerable to external disruptions. Furthermore, rising logistics costs and the difficulty in predicting market movements increase the need for more flexible and adaptable supply chain management approaches (World Bank, 2024; UNCTAD, 2025).

2.3 Supply Chain Performance (SCP)

Supply chain performance is a fundamental concept in both operations management and strategic management, reflecting an organization's ability to achieve its objectives through the effective and integrated management of activities related to the flow of products, information, and services. Measuring supply chain performance provides organizations with a crucial tool for evaluating the effectiveness of their operational processes, identifying strengths and weaknesses, and implementing improvement initiatives to enhance efficiency and competitiveness (Gunasekaran et al., 2004).

The reviewed literature defines supply chain performance as a set of indicators and metrics used to assess the ability of supply chains to achieve operational and strategic objectives. Previous studies commonly identify cost efficiency, service quality, responsiveness, and resilience among the key dimensions used to evaluate supply chain performance (Gunasekaran et al., 2004; Mentzer et al., 2001).

The reviewed studies indicate that supply chain performance measurement has evolved from evaluating individual operational functions to assessing the performance of the entire supply chain as an integrated system. The literature emphasizes that effective coordination and collaboration among suppliers, manufacturers, distributors, and customers are essential for achieving superior supply chain performance (Mentzer et al., 2001).

The key dimensions of supply chain performance include:

1. Responsiveness

According to the reviewed literature, responsiveness refers to an organization's ability to react quickly and effectively to changes in customer demand and market conditions. Previous studies suggest that AI applications may enhance responsiveness by providing real-time data analysis and predictive capabilities (Baryannis et al., 2019).

2. Resilience

The reviewed literature describes resilience as the ability of supply chains to adapt to disruptions and unexpected changes. Previous studies also suggest that AI applications may strengthen supply chain resilience by supporting risk analysis, scenario planning, and resource allocation (Ivanov & Dolgui, 2021).

AI applications contribute to enhancing supply chain resilience by enabling organizations to analyze potential risks, develop alternative scenarios, and support decisions related to resource allocation and supply planning (Ivanov, D., & Dolgui, 2021).

3. Service Quality

The reviewed studies identify service quality as one of the important indicators of supply chain performance. The literature suggests that improvements in information sharing and forecasting accuracy may contribute to higher customer satisfaction and more reliable service delivery (Christopher, 2016).

4. Cost Reduction

According to the reviewed literature, cost efficiency is one of the primary objectives of supply chain management. Previous studies suggest that AI applications may contribute to reducing operational costs by improving planning, optimizing resource utilization, and minimizing waste (Pournader et al., 2021).

Supply Chain Performance in the Palestinian Context

The reviewed literature indicates that Palestinian companies face several challenges that affect supply chain performance, including high transportation costs, delays in receiving raw materials, dependence on external markets, and uncertainty in market conditions. These challenges highlight the importance of adopting more flexible and resilient supply chain management approaches capable of operating under conditions of uncertainty (World Bank, 2024).

The reviewed studies further suggest that artificial intelligence applications have the potential to improve supply chain performance in Palestinian companies by supporting demand forecasting, enhancing planning processes, reducing operational risks, and providing timely information that facilitates more effective decision-making (Belhadi et al., 2024).

2.4 Supply Chain Efficiency (SCE)

Supply chain efficiency (SCE) is widely recognized in the reviewed literature as an organization's ability to achieve its objectives through the optimal use of available resources while minimizing waste and unnecessary costs. According to Christopher (2016), efficiency is one of the primary objectives of supply chain management because it is closely associated with delivering greater customer value and achieving sustainable

competitive advantage.

The reviewed literature describes supply chain efficiency as the relationship between inputs and outputs, reflecting an organization's ability to achieve maximum results with minimum resources. Previous studies suggest that supply chain efficiency involves optimizing the utilization of human, material, and information resources, reducing process completion times, and lowering costs related to inventory, transportation, and production (Christopher, 2016).

According to the reviewed studies, supply chain efficiency encompasses several key dimensions, including:

1. Inventory Management Efficiency

The reviewed literature identifies inventory management as a fundamental component of supply chain efficiency. Previous studies suggest that maintaining optimal inventory levels is essential for balancing inventory holding costs and product availability. The literature also indicates that artificial intelligence applications may support inventory optimization by analyzing demand patterns and forecasting future inventory requirements (Baryannis et al., 2019).

2. Logistics Efficiency

According to the reviewed literature, logistics efficiency involves improving transportation and distribution activities while minimizing the associated time and operational costs. Previous studies suggest that AI-based analytical tools may assist organizations in optimizing transportation routes, improving delivery scheduling, and enhancing overall logistics performance (Pournader et al., 2021).

3. Decision-Making Efficiency

The reviewed studies indicate that decision-making efficiency is an important dimension of supply chain efficiency. The literature suggests that AI-based systems can support managers by providing advanced data analysis and predictive insights, enabling more informed and evidence-based decisions rather than relying solely on personal judgment and experience (Davenport & Ronanki, 2018).

Importance of Supply Chain Efficiency for Palestinian Companies

The reviewed literature indicates that improving supply chain efficiency is particularly important for Palestinian companies due to the economic and logistical challenges affecting their operations. Previous studies suggest that enhancing supply chain efficiency may help organizations reduce operational costs, strengthen their competitiveness, and improve their responsiveness to changing market demands (Palestinian Central Bureau of Statistics [PCBS], 2023).

The reviewed studies further suggest that artificial intelligence (AI) applications have the potential to support Palestinian companies by improving the utilization of limited resources, enhancing planning accuracy, and reducing the impact of uncertainty on supply chain operations (Belhadi et al., 2024).

2.5 Applications of Artificial Intelligence in Supply Chains

The reviewed literature indicates that the rapid development of artificial intelligence (AI) technologies has led to a wide range of applications that are transforming traditional supply

chain management practices. Previous studies suggest that organizations are increasingly adopting AI-based systems that utilize data analytics, predictive capabilities, and intelligent decision support to improve supply chain performance and operational efficiency (Baryannis et al., 2019).

1. Demand Forecasting

According to the reviewed literature, demand forecasting is one of the most important applications of AI in supply chain management. Previous studies suggest that AI technologies enable organizations to analyze historical data, market information, and customer behavior patterns to generate more accurate demand forecasts. The literature indicates that these capabilities may improve production planning and help reduce product shortages and excess inventory (Min, 2010).

In the Palestinian context, the reviewed literature suggests that AI-based forecasting applications may help organizations manage demand fluctuations associated with economic uncertainty and improve procurement and production planning (World Bank, 2024).

2. AI-Based Inventory Management

The reviewed studies identify inventory management as one of the supply chain functions that can benefit significantly from AI applications. According to previous research, intelligent systems may support organizations in determining optimal inventory levels, identifying appropriate reorder points, and reducing inventory holding costs. These capabilities may help organizations balance product availability with lower capital investment in inventory (Baryannis et al., 2019).

3. Transportation and Logistics Optimization

The reviewed literature suggests that AI technologies are increasingly applied to transportation and logistics management by analyzing transportation data, identifying optimal routes, and improving delivery scheduling. Previous studies indicate that these applications may reduce delivery times and operational costs while improving logistics efficiency. The literature also suggests that these applications are particularly relevant in the Palestinian context due to the transportation and logistical challenges affecting supply chain activities (Pournader et al., 2021).

4. Supplier Selection and Risk Management

According to the reviewed literature, AI applications may support supplier selection and supply chain risk management by analyzing supplier-related data, evaluating supplier performance, and identifying potential risks. Previous studies suggest that these capabilities may assist organizations in selecting more reliable suppliers and strengthening supply chain resilience (Belhadi et al., 2024).

5. Intelligent Decision Support Systems

The reviewed studies indicate that AI-powered decision support systems provide analytical capabilities that may assist managers in making more informed decisions regarding procurement, production, inventory management, and distribution. The literature suggests that these systems facilitate the transition from experience-based decision-making to data-driven managerial practices (Davenport & Ronanki, 2018).

Overall, the reviewed literature suggests that artificial intelligence has emerged as an important enabler for improving supply chain performance and efficiency. Previous studies

indicate that AI applications may contribute to improving forecasting accuracy, optimizing inventory management, enhancing logistics performance, strengthening supply chain resilience, and supporting managerial decision-making. In the Palestinian context, the literature suggests that these applications have the potential to help organizations address operational and economic challenges by improving planning capabilities, reducing operational costs, and enhancing overall supply chain efficiency (Belhadi et al., 2024).

3. Previous Studies and Literature Review

In recent years, interest in studying the relationship between artificial intelligence (AI) and supply chain management has grown, particularly during the period from 2020 to 2026. This increased interest has been spurred by the rapid development of Fourth Industrial Revolution technologies and the growing reliance on big data, machine learning, and predictive analytics to support operational and strategic decision-making. Furthermore, global disruptions, including supply chain disruptions caused by the COVID-19 pandemic and geopolitical instability, have highlighted the need to develop smarter, more resilient, and adaptable supply chains capable of operating in unstable environments (Ivanov & Dolgui, 2021).

Recent studies indicate that AI has become a key driver in reshaping supply chain operations. Supply chain management no longer relies solely on human expertise or traditional planning methods; organizations are increasingly depending on intelligent systems capable of processing massive amounts of data, predicting future changes, and proposing more efficient operational solutions (Baryannis et al., 2019; Min, 2010).

Baryannis et al. (2019), Pournader et al. (2021), and Toorajipour et al. (2021) highlighted that recent studies have focused on several key areas where artificial intelligence is applied within supply chains, including demand forecasting, inventory management, production planning, transportation and logistics optimization, risk management, and sustainability. The following section provides an analysis of the most important research trends and developments in these areas during the period (2019-2026).

3.1 Studies on the Use of Artificial Intelligence in Demand Forecasting (AI-Based Demand Forecasting)

Demand forecasting is a key area of research in modern studies, given its direct role in improving supply chain planning and reducing uncertainty. Previous studies have indicated that traditional demand forecasting methods face limitations in dealing with rapid market changes, while artificial intelligence techniques offer greater capabilities in identifying complex patterns and predicting future customer behavior (Babai et al., 2022; Angos et al., 2022).

Feizabadi (2022) found that applying machine learning techniques to demand forecasting contributes to improved supply chain performance by increasing forecast accuracy and narrowing the gap between supply and demand. The study highlighted that improved forecast accuracy leads to better production and inventory management decisions. It also emphasized that data quality and information systems integration are crucial factors for the successful implementation of AI-based forecasting models.

Similarly, Babai et al. (2022) demonstrated that AI-based forecasting models, particularly neural networks and deep learning algorithms, achieve higher levels of

accuracy compared to traditional statistical methods.

In general, these studies demonstrate a broad consensus on the pivotal role of artificial intelligence (AI) in enhancing demand forecasting capabilities. However, most current research has focused on large enterprises and developed markets with extensive data resources, while studies addressing the application of AI forecasting models in small and medium-sized enterprises (SMEs) and developing economies remain limited.

In the Palestinian context, research on the use of AI for demand forecasting is particularly important due to the economic uncertainty, trade restrictions, and supply chain disruptions affecting the Palestinian market. These conditions make demand patterns more difficult to predict and increase the need for more advanced analytical tools to support planning and supply chain decision-making (UNCTAD, 2025).

3.2 Studies on Artificial Intelligence and Inventory Management (AI and Inventory Management)

Inventory management is one of the supply chain functions most affected by artificial intelligence (AI) applications. Intelligent systems enable organizations to determine optimal inventory levels, reduce storage costs, and improve reorder timing through advanced data analytics and forecasting capabilities.

A study by Choi et al. (2021) demonstrated that using data analytics and AI techniques improves inventory decision-making by analyzing historical data and predicting future demand fluctuations. The study also confirmed that integrating AI with enterprise resource planning (ERP) systems enhances organizational capabilities by improving coordination and integration across various business functions.

Similarly, Belhadi et al. (2024) found that AI-based inventory management systems contribute to reducing excess inventory levels, improving inventory turnover rates, and increasing organizational responsiveness to market changes.

Previous studies generally agree that AI contributes to improved inventory management efficiency; however, the extent of its impact varies, as results depend on organizational readiness, data quality, and the availability of technological infrastructure.

In the Palestinian context, the adoption of artificial intelligence in inventory management represents a potential opportunity to improve organizational efficiency, especially given the challenges associated with high storage costs and difficulties in maintaining stable flows of materials and products.

3.3 Studies on Artificial Intelligence in Planning and Production (AI in Planning and Production)

Recent studies have increasingly focused on the role of artificial intelligence (AI) in improving planning and production processes, particularly in the industrial sector. AI technologies enable organizations to optimize production scheduling, rationalize resource allocation, reduce waste, and enhance the use of energy and raw materials.

A study by Frank et al. (2019) revealed that integrating smart technologies into industrial processes improves operational flexibility and enhances organizations' ability to respond to market changes. The study also indicated that AI facilitates the transition from traditional planning methods to data-driven predictive planning models.

Furthermore, Dwivedi et al. (2021) emphasized that the development of smart supply

chains requires integrating artificial intelligence with complementary digital technologies, including the Internet of Things (IoT), big data analytics, and cloud computing, to improve operational efficiency and organizational decision-making.

For Palestinian companies, implementing AI in planning and production can contribute to better utilization of limited resources and reduced operating costs. However, limited technological investment and infrastructure constraints may pose significant obstacles to the widespread adoption of these technologies.

3.4 Studies on Artificial Intelligence in Transportation and Logistics (AI in Transportation and Logistics)

The transportation and logistics sector is among those that have witnessed a significant expansion in the adoption of artificial intelligence (AI) technologies. Organizations are increasingly turning to intelligent algorithms to optimize transportation routes, reduce delivery times, and improve the utilization of vehicles and logistical resources.

Pournader et al. (2021) and Belhadi et al. (2024) highlighted that artificial intelligence contributes to the development of smart logistics by enhancing information flow, optimizing transportation and distribution activities, and supporting data-driven decision-making across supply chain operations.

Furthermore, Ivanov & Dolgui (2021) emphasized that adopting intelligent systems enables organizations to develop more resilient supply chains by facilitating rapid replanning and adaptation in the event of disruptions to transportation or supply operations. These applications are particularly important in the Palestinian context due to the challenges associated with transporting goods and the high costs of transportation. AI-based solutions can support organizations in improving logistics planning, optimizing transportation activities, and reducing operational delays.

3.5 Studies on Artificial Intelligence and Supply Chain Risk Management (AI and Supply Chain Risk Management)

Risk management has become a central focus of modern supply chain research, particularly following global disruptions that exposed vulnerabilities in many traditional supply chain systems. Recent studies have increasingly focused on the ability of artificial intelligence (AI) to predict risks, analyze future scenarios, and support proactive decision-making.

Ivanov, D., & Dolgui, A. (2021) noted that AI enables organizations to develop resilient supply chains by facilitating early risk detection and providing appropriate alternative operational strategies.

Similarly, Belhadi et al. (2023) emphasized that artificial intelligence techniques enhance organizations' ability to manage uncertainty and strengthen supply chain resilience by improving risk detection, visibility, and adaptive decision-making capabilities.

In the Palestinian context, this area is of particular importance given the multiple operational and economic risks faced by organizations. Therefore, the use of AI-based forecasting tools represents a valuable approach to enhancing organizational resilience and improving their ability to respond effectively to potential disruptions.

3.6 Studies on Artificial Intelligence and Supply Chain Sustainability (AI and Supply Chain Sustainability)

Recent studies have increasingly focused on the relationship between artificial intelligence (AI) and supply chain sustainability, as organizations strive to achieve both economic and environmental goals simultaneously. AI has emerged as a crucial enabler for supporting sustainable supply chain practices by optimizing resource utilization, enhancing operational efficiency, and mitigating environmental impacts.

Wamba et al. (2020) indicated that adopting AI and data analytics empowers organizations to improve resource utilization, reduce waste, and support sustainable business practices. Their study emphasized the role of AI-powered capabilities in enhancing organizational performance while contributing to sustainability objectives.

Furthermore, previous research has demonstrated that AI can contribute to improved energy efficiency, reduced emissions associated with transportation activities, and enhanced resource management across all supply chain processes.

4. Analysis of Points of Agreement, Disagreement, and Research Gaps

4.1 Points of Agreement Among Previous Studies

Previous studies generally show a high level of agreement regarding several key findings, including:

1. Artificial intelligence (AI) has become a key driver in the development of modern supply chains.
2. AI applications contribute to improving prediction accuracy and enhancing decision-making processes.
3. AI supports cost reduction and improved operational efficiency.
4. The successful implementation of AI depends on the availability of high-quality data, advanced technological infrastructure, and qualified human resources.

4.2 Points of Disagreement Among Previous Studies

While there is general agreement on the importance of AI in supply chain management, previous studies differ in several aspects, including:

1. The nature of the industries and sectors examined.
2. The level of AI adoption and technological maturity.
3. The indicators and dimensions used to measure supply chain performance.
4. The economic and technological contexts in which the studies were conducted.

4.3 Research Gaps

Based on a review of previous literature, several research gaps can be identified:

1. Geographical gap: Only a limited number of studies have addressed the application of artificial intelligence (AI) in supply chains within the Palestinian context.
2. Application gap: Many current studies have focused on specific AI applications, such as demand forecasting or inventory management, while a more comprehensive analysis of the

overall role of AI in improving supply chains is still needed.
3. Organizational gap: There is a lack of sufficient research examining the readiness of small and medium-sized enterprises (SMEs) to adopt AI technologies.
4. Contextual gap: The findings of global studies may not be directly applicable to the Palestinian environment due to differences in economic conditions, technological infrastructure, and business contexts.
Accordingly, this study seeks to address these gaps by examining the role of AI in improving the performance and efficiency of supply chains within Palestinian institutions. It aims to determine the extent to which AI contributes to process improvement, enhanced decision-making capabilities, and strengthened organizational competitiveness.

5. Research Methodology

This study will adopt an analytical approach to examine the role of artificial intelligence (AI) in improving supply chain performance and efficiency. This will be achieved through a comprehensive review and analysis of the scientific literature published between 2020 and 2026. The study will be classified as an analytical review aimed at providing a comprehensive understanding of current research trends and identifying the relationship between AI applications and various dimensions of supply chain management. These dimensions will include demand forecasting, inventory management, production planning, transportation and logistics, risk management, and supply chain sustainability.

To achieve the study's objectives, the research will employ content analysis of the scientific literature, which is a suitable methodology for compiling and evaluating accumulated knowledge in a specific research area. This method will enable the systematic classification of previous studies according to their main themes, research methodologies, key findings, and practical applications, while also facilitating the identification of emerging research trends and challenges associated with the application of AI in supply chain management (Tranfield et al., 2003).

Furthermore, the study will utilize subject analysis to classify the selected literature based on the main application areas of AI in supply chains. Through this approach, the reviewed studies will be analyzed to assess how AI technologies contribute to improving operational performance, decision-making, forecasting accuracy, logistics, supply chain resilience, and sustainability. Additionally, the analysis will aim to identify points of agreement and disagreement among previous studies and highlight existing research gaps, particularly those related to developing countries and the Palestinian context, where empirical evidence on AI-assisted supply chain management remains limited.

To achieve the objectives of this study, a comprehensive search will be conducted across several internationally recognized academic databases, including Scopus, Web of Science, ScienceDirect, SpringerLink, Emerald Insight, and IEEE Xplore. These databases will be selected because they provide access to high-quality, peer-reviewed publications covering the fields of artificial intelligence, digital transformation, operations management, and supply chain management. The literature search will utilize a range of relevant keywords, such as artificial intelligence, supply chain management, supply chain performance, supply chain efficiency, machine learning, predictive analytics, and smart supply chain. Additionally, logical linking (AND/OR) operators will be employed to refine the search strategy and retrieve the most relevant studies.

The selection of reviewed studies will be guided by predefined inclusion and exclusion criteria to ensure the quality and relevance of the literature. The inclusion criteria

will stipulate that studies should be published between 2020 and 2026, appear in peer-reviewed journals or proceedings of reputable international conferences, and address the application of artificial intelligence (AI) in supply chain management or its impact on supply chain performance and efficiency. Furthermore, the review will include studies focusing on key AI application areas, such as demand forecasting, inventory management, production planning, transportation and logistics, risk management, and sustainability. Conversely, studies that are not directly related to the research topic, non-peer-reviewed publications, and studies that focus solely on the technical aspects of AI without addressing its managerial or operational implications for supply chain management will be excluded.

Following the selection process, the identified studies will undergo systematic review, analysis, and classification to summarize the current state of knowledge regarding the role of AI in improving supply chain management. The analysis will focus on evaluating the contribution of AI technologies to enhancing demand forecasting accuracy, improving inventory management, production and operational planning, logistics performance, risk management, and sustainable supply chain practices. In addition, the results of previous studies will be compared to identify areas of convergence and divergence, providing a comprehensive understanding of the current research landscape and highlighting current knowledge gaps that may guide future research in this field.

This methodology will provide a comprehensive overview of the available scientific knowledge related to the study topic. However, most previous studies have focused on organizations in developed countries, while research on the application of artificial intelligence (AI) in supply chains in developing countries, particularly in the Palestinian context, remains limited. Therefore, this study will aim to contribute to bridging this gap by analyzing existing literature and developing a better understanding of the opportunities and challenges associated with applying AI to improve supply chain performance and efficiency in Palestinian companies.

6. Literature-Based Discussion and Expected Findings

A review of the scientific literature published between 2020 and 2026 indicates a growing interest in examining the role of artificial intelligence (AI) in developing and improving supply chain performance and efficiency. Previous studies suggest that AI has become an important enabling technology supporting the transformation from traditional supply chains to smarter supply chain models based on data analytics, prediction, automation, and real-time data-driven decision-making. Furthermore, the reviewed literature suggests that AI applications are not limited to a single operational function but are associated with improvements across various stages of the supply chain, including planning, procurement, production, warehousing, transportation, distribution, and customer service (Baryannis et al., 2019; Ivanov & Dolgui, 2021).

6.1 The Impact of Artificial Intelligence on Improving Forecasting Accuracy

Previous studies suggest that improving forecasting accuracy represents one of the most important contributions of artificial intelligence (AI) applications to supply chain management. Machine learning and deep learning technologies have supported the development of advanced predictive models capable of analyzing historical data, customer behavior, market trends, and external factors, which may result in more accurate forecasts compared with traditional forecasting methods.

The studies also show that accurate demand forecasting allows organizations to

improve their planning processes, reduce the gap between supply and demand, and mitigate the risks of product shortages and inventory overstocking. Furthermore, AI-powered forecasting enables organizations to proactively respond to market changes rather than relying on corrective measures after problems occur (Feizabadi, 2022).

In the Palestinian context, these findings are particularly relevant given the challenges associated with market instability and the difficulty of accurately forecasting demand patterns. AI technologies can provide Palestinian companies with advanced analytical tools that support more effective planning processes and reduce the impact of economic fluctuations on their operations.

6.2 The Impact of Artificial Intelligence on Reducing Operating Costs

Previous studies suggest that artificial intelligence (AI) applications may contribute to reducing operating costs by improving resource utilization, minimizing waste, and enhancing the efficiency of various supply chain processes. AI-based systems can support organizations in identifying optimal operational alternatives, improving process scheduling, and reducing inefficiencies in production, transportation, and warehousing activities.

Furthermore, the literature indicates that AI applications have the potential to reduce logistics costs through transportation route optimization, delivery time prediction, and improved resource allocation. Previous studies have reported that organizations implementing AI-powered analytics may achieve improved operational efficiency and cost performance compared with traditional management approaches (Wamba et al., 2020).

In the Palestinian context, reducing operating costs represents a critical priority due to high transportation expenses, procurement challenges, and limited resources. Therefore, the adoption of AI technologies may provide Palestinian companies with an opportunity to enhance operational efficiency and strengthen their competitiveness.

6.3 The Impact of Artificial Intelligence on Improved Inventory Management

Previous studies suggest that inventory management is among the supply chain functions that can benefit significantly from artificial intelligence (AI) applications. AI-based systems can support organizations in determining optimal inventory levels, improving reorder decisions, and reducing the risks associated with both overstocking and understocking.

These applications rely on analyzing sales data, historical demand patterns, customer behavior, and supplier performance, which may enable organizations to make more informed decisions regarding inventory control and procurement processes. Furthermore, previous research indicates that AI technologies may contribute to improving inventory turnover and reducing the capital invested in stored products (Choi et al., 2021).

6.4 The Impact of Artificial Intelligence on Enhanced Responsiveness

Reviewed studies demonstrate that artificial intelligence enhances organizational responsiveness by enabling organizations to react more quickly and effectively to changes in market conditions and customer demands. This is achieved by providing accurate and immediate information that supports informed and timely management decisions.

This rapid response allows organizations to adjust production plans, modify supply strategies, and efficiently reallocate resources in response to unforeseen disruptions.

Previous studies have confirmed that organizations using AI-powered systems demonstrate greater adaptability to market fluctuations compared to those relying on traditional management (Ivanov & Dolgui, 2021).

6.5 The Impact of Artificial Intelligence on Enhancing Supply Chain Resilience

Supply chain resilience has become an important focus of recent research, particularly due to the increasing number of disruptions affecting global supply chains. Previous studies suggest that artificial intelligence (AI) can support supply chain resilience by enabling organizations to identify potential risks, analyze alternative scenarios, and develop appropriate response strategies.

The literature indicates that AI-based systems may assist organizations in identifying vulnerabilities within their supply chains, evaluating supplier reliability, and developing contingency plans to address potential disruptions. Therefore, AI applications have the potential to contribute to the development of more resilient supply chains capable of adapting to uncertainty and unexpected challenges (Ivanov & Dolgui, 2021).

In the Palestinian context, these applications are particularly relevant due to the unstable economic and operational conditions faced by organizations.

6.6 The Impact of Artificial Intelligence on Decision Support

Previous studies suggest that artificial intelligence (AI) can provide advanced support for managerial decision-making by transforming large volumes of data into valuable and actionable insights. AI-based systems may assist managers in making more informed decisions related to procurement, production planning, inventory management, transportation, and supply chain risk management.

The literature indicates that AI-assisted decision-making relies on continuous data analysis rather than relying solely on human experience or intuition. This capability may contribute to reducing decision-making errors and improving the quality and effectiveness of managerial decisions (Davenport & Ronanki, 2018).

In the Palestinian context, the adoption of AI-based decision support tools may provide organizations with opportunities to enhance decision quality, particularly in an environment where efficient utilization of limited resources is essential for maintaining operational performance and competitiveness.

6.7 The Impact of Artificial Intelligence on Enhancing Sustainability

Previous studies suggest a positive relationship between artificial intelligence adoption and sustainability practices in supply chain management. AI technologies can support organizations in optimizing resource utilization, reducing waste, improving energy efficiency, and minimizing environmental impacts associated with production and transportation activities.

Furthermore, the literature indicates that AI may contribute to the development of sustainable supply chains by providing advanced analytical capabilities that support organizations in balancing economic, environmental, and social objectives (Wamba et al., 2020).

In the Palestinian context, AI applications may provide organizations with opportunities to improve resource utilization, reduce operational waste, and promote more

sustainable production and distribution practices, particularly under conditions of limited resources and operational constraints.

6.8 General Discussion of the Literature-Based Findings

Overall, the reviewed literature suggests that artificial intelligence (AI) has emerged as an important strategic technology for supporting the improvement of supply chain performance and efficiency. Previous studies indicate that AI applications may influence various operational processes by supporting better decision-making, enhancing adaptability, and contributing to supply chain resilience and competitiveness. The reviewed studies also highlight that the value of artificial intelligence does not depend solely on adopting advanced technologies, but also on organizations' ability to effectively integrate these technologies into their management practices and operational strategies.

Furthermore, the literature indicates that successful AI implementation depends on several critical factors, including the availability of high-quality data, appropriate technological infrastructure, organizational readiness, and skilled human resources capable of utilizing intelligent systems effectively. Therefore, Palestinian companies may need to strengthen their digital capabilities and develop appropriate technology adoption strategies to benefit from the potential opportunities offered by AI in supply chain management.

Based on the reviewed literature, artificial intelligence represents a promising opportunity for Palestinian companies to move toward smarter and more efficient supply chain models. However, achieving these potential benefits requires addressing challenges related to digital infrastructure, human resource development, data management, and the establishment of clear digital transformation strategies.

7. Recommendations

Based on the insights derived from the literature review regarding the role of artificial intelligence (AI) in improving supply chain performance and efficiency, as well as the challenges associated with implementing these technologies, this study proposes a set of recommendations aimed at enhancing organizations' ability to utilize AI applications. These recommendations are particularly relevant in the Palestinian context, where digital transformation remains at an early stage compared with more technologically advanced economies.

7.1 Investing in Digital Infrastructure

Based on the literature review, this study recommends strengthening investment in digital infrastructure, as it represents the foundation upon which AI applications in supply chains are developed. A successful transition toward smart supply chains requires integrated information systems, structured databases, efficient communication networks, and digital platforms capable of supporting real-time data collection, processing, and analysis.

The literature suggests that weak digital infrastructure may represent one of the major obstacles to AI adoption, as intelligent systems depend heavily on the availability of accurate, comprehensive, and reliable data for prediction, analysis, and decision-making (Choi et al., 2021). Therefore, organizations should consider strengthening their Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) systems by connecting different supply chain stakeholders including suppliers, manufacturers, and distributors—through integrated digital platforms.

In the Palestinian context, this recommendation may be particularly relevant given the need to accelerate digital transformation within economic institutions. Investing in digital infrastructure can contribute to improving operational efficiency, reducing reliance on manual procedures, and enhancing organizations' ability to respond to market fluctuations and demand volatility. This may require institutional support through encouraging investment in technology and creating a regulatory environment that facilitates the adoption of modern digital solutions.

Furthermore, the study recommends adopting a phased approach to digital transformation through a clear strategic plan. This approach should begin by identifying processes with the greatest impact on performance, such as inventory management and demand forecasting, and then expand toward more advanced applications, including predictive analytics and intelligent automation.

7.2 Promoting Digital Transformation Culture

The study recommends developing an organizational culture that supports digital transformation. The successful implementation of artificial intelligence (AI) depends not only on technological capabilities but also on the willingness of employees and management to accept and adapt to technological changes. Therefore, organizations should enhance awareness of the importance of AI and clarify its role in improving performance while complementing, rather than replacing, human capabilities.

Organizations should also consider involving employees in different stages of digital transformation and creating an environment that encourages continuous learning and innovation. These practices may help reduce resistance to change and increase the likelihood of successful adoption of intelligent systems (Vial, 2019).

7.3 Improving Data Management and Digital Governance

The study recommends that organizations establish clear data management policies, recognizing data as a fundamental resource supporting AI applications. This requires ensuring data quality, continuous updating, and developing appropriate mechanisms for data protection and its safe and ethical use.

Furthermore, organizations should strengthen digital governance practices by developing policies related to data privacy, cybersecurity, and transparency in the use of intelligent algorithms. Such practices may support the responsible implementation of AI applications in supply chain processes.

7.4 Enhancing Industry-Academia Collaboration

The study recommends strengthening collaboration between economic institutions, universities, and research centers to support the development of AI solutions tailored to the Palestinian context. Such collaboration may contribute to promoting applied research, developing cost-effective smart solutions, and providing practical training opportunities for students and employees.

Furthermore, collaboration between academia and industry may help bridge the gap between theoretical knowledge and practical application, while enhancing the ability of local organizations to benefit from global advancements in artificial intelligence and supply chain management.

7.5 Recommendations for Future Research

The study suggests conducting further empirical research to examine the impact of artificial intelligence (AI) applications on supply chain performance across various sectors in Palestine, including industrial, commercial, agricultural, and logistics sectors. It also recommends that future studies investigate the regulatory and technological factors that may influence organizational readiness for AI adoption.

7.6 Conclusion

The literature review suggests that realizing the potential benefits of artificial intelligence in improving supply chain performance and efficiency requires a comprehensive strategic vision that combines investment in technology, employee skills development, improved data management practices, and the promotion of a culture of innovation and digital transformation. In the Palestinian context, adopting these recommendations may represent an important step toward developing more efficient, resilient, and competitive supply chains capable of adapting to rapid changes in the business environment.

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