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FACTORS INFLUENCING TECHNOLOGY ADOPTION IN LOGISTICS MANAGEMENT: SLR TO OPTIMIZE DIGITAL TRANSFORMATION

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ABSTRACT

Digital transformation in the logistics sector is increasingly important to improve the efficiency, speed, and accuracy of services in the global supply chain. However, the adoption of technology in logistics management still faces various challenges, both from the internal side of the organization and external factors. This study aims to identify and analyze the factors influencing the adoption of technology in logistics management through a systematic literature review (SLR) approach. The method used involves the collection and critical analysis of 60 scientific articles published in the period 2018 to 2024 from various reputable databases. The results show that factors such as technology readiness, human resource competence, top management support, external pressures, and relative benefits of technology are highly influential in the adoption process. The discussion further outlined how the integration of these factors can accelerate digital transformation and increase the competitiveness of logistics companies. The study concludes that a strategic approach that considers technical, organizational, and environmental aspects is essential to drive successful technology adoption. It is recommended that logistics companies actively evaluate the readiness of the internal and external environment before implementing new technologies and use the results of this study as a reference in strategic decision-making in the field of logistics digitalization.

Keywords: *Technology Adoption, Logistics Management, Digital Transformation, Systematic Literature Review, Technology Innovation*

ABSTRAK

Transformasi digital dalam sektor logistik semakin penting untuk meningkatkan efisiensi, kecepatan, dan ketepatan layanan dalam rantai pasok global. Namun, adopsi teknologi dalam manajemen logistik masih menghadapi berbagai tantangan, baik dari sisi internal organisasi maupun faktor eksternal. Penelitian ini bertujuan untuk mengidentifikasi dan menganalisis faktor-faktor yang memengaruhi adopsi teknologi dalam manajemen logistik melalui pendekatan systematic literature review (SLR). Metode yang digunakan melibatkan pengumpulan dan analisis kritis terhadap 60 artikel ilmiah yang dipublikasikan dalam rentang waktu 2018 hingga 2024 dari berbagai basis data bereputasi. Hasil penelitian menunjukkan bahwa faktor-faktor seperti kesiapan teknologi, kompetensi sumber daya manusia, dukungan manajemen puncak, tekanan eksternal, serta manfaat relatif dari teknologi sangat berpengaruh dalam proses adopsi. Pembahasan lebih lanjut menguraikan bagaimana integrasi faktor-faktor tersebut dapat mempercepat transformasi digital dan meningkatkan daya saing perusahaan logistik. Penelitian ini menyimpulkan bahwa pendekatan strategis yang mempertimbangkan aspek teknis, organisasional, dan lingkungan sangat penting untuk mendorong keberhasilan adopsi teknologi. Disarankan agar perusahaan logistik secara aktif mengevaluasi kesiapan internal dan lingkungan eksternal sebelum menerapkan teknologi baru serta menjadikan hasil studi ini sebagai referensi dalam pengambilan keputusan strategis di bidang digitalisasi logistik.

Kata Kunci: Adopsi Teknologi, Manajemen Logistik, Transformasi Digital, Systematic Literature Review, Inovasi Teknologi

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INTRODUCTION

The era of digital transformation has brought a paradigm shift in various industrial sectors, including in the field of logistics management. As the complexity of global supply chains increases, consumer demands for faster deliveries, and the pressure to reduce operational costs, logistics companies are increasingly recognizing the importance of adopting digital technologies to maintain a competitive advantage (Hamjen et al., 2022). Efficient and effective logistics management is a crucial factor in the company's operational success, especially amid global economic uncertainty and supply chain disruptions that occur after the COVID-19 pandemic (Azkia & Safiri, 2025). Digital transformation in logistics management encompasses various aspects of technology such as the Internet of Things (IoT), artificial intelligence (AI), big data analytics, cloud computing, blockchain, and automation technologies. The implementation of these technologies offers the potential to optimize logistics processes, increase supply chain visibility, reduce human error, and accelerate response times to changing market demands. (Maharani et al., 2023). Although the benefits of adopting this technology have been widely proven in various empirical studies, the rate of adoption of digital technology in logistics management still varies significantly among different companies and countries. This gap in technology adoption drives the importance of understanding the factors that influence logistics companies' decisions in adopting new technology solutions. According to (Verhoef et al., 2021), digital transformation is not just about the implementation of technology, but it also involves fundamental changes in business models, strategies, processes, and organizational culture. Therefore, a comprehensive understanding of the factors that drive or hinder the adoption of technology in logistics management becomes crucial for designing an effective implementation strategy.

Previous research has identified various factors influencing technology adoption in the general business context, such as technology factors (relative superiority, compatibility, complexity), organizational factors (company size, top management support, resources), and environmental factors (competitive pressures, regulatory support) (United Nations, 2022). However, the unique characteristics of the logistics sector with its supply chain complexity, the need for multi-stakeholder coordination, and the high intensity of information necessitate a more specific analysis of how these factors play a role in the context of logistics management. In recent years, the COVID-19 pandemic has accelerated digitalization in various sectors, including logistics. This acceleration is driven by the need for operational resilience amid physical restrictions and global supply chain disruptions (Winarsih et al., 2021). Logistics companies are forced to adopt digital technologies such as e-commerce platforms, automated warehouse management systems, and predictive data analytics to maintain the continuity of their operations. However, the pace of this adoption has been uneven, with some companies able to adapt quickly while others face various obstacles. One of the significant barriers to the adoption of logistics technology is the gap between the expectations and realities of implementation. Based on a study conducted by (Shaiful Fitri Abdul Rahman et al., 2022), many companies have difficulty integrating new technologies with existing systems, managing change resistance from employees, or measuring the return on investment (ROI) of their technology investments. This technical and organizational complexity is often overlooked in the academic literature, which tends to focus on potential benefits rather than practical implementation challenges. On the other hand, an increasingly competitive and volatile business environment encourages companies to continue to innovate in their logistics management practices. The ability to collect, analyze, and leverage data in real-time is becoming increasingly important for optimizing shipping routes, managing inventory efficiently, and anticipating customer demand (Shekhar & Laboratories, 2025). Technologies such as AI and machine learning enable companies to automate complex logistics decision-

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making, while blockchain offers unprecedented transparency and traceability in the supply chain.

It is also important to understand that the adoption of technology in logistics management does not happen in a vacuum. The broader business ecosystem, including government policies, national digital infrastructure, and the readiness of business partners, plays a significant role in facilitating or hindering digital transformation. Comparative studies conducted by (Lee, 2021) It shows that countries with more advanced digital infrastructure and policies that support innovation tend to have higher rates of adoption of logistics technologies. This shows the importance of a holistic approach that considers external factors in addition to internal organizational factors. In addition, the sustainability aspect is also increasingly being considered in the adoption of logistics technology. Supply chain digitalization aims not only to improve operational efficiency, but also to reduce environmental impact through route optimization, waste reduction, and improved energy efficiency (Tetteh et al., 2024). Technologies such as IoT and analytics enable companies to monitor and reduce the carbon footprint of their logistics operations, in line with increasingly stringent consumer demands and regulations regarding sustainable business practices. Although previous research has identified a variety of factors influencing the adoption of technology in logistics management, there is still a gap in a comprehensive understanding of how these factors interact and how their priorities change over time or differ between contexts. The Systematic Literature Review (SLR) offers a structured methodology for integrating findings from various empirical studies, identifying trends and patterns in the literature, and generating a more comprehensive conceptual framework (Tranfield, 2013).

The SLR approach in this study allows for the synthesis of knowledge from different fields such as operations management, information systems, and supply chain studies to provide a holistic understanding of the factors influencing the adoption of technology in logistics management. Through a systematic analysis of the current literature, this study will not only identify key factors, but also explore the causal relationships between factors, analyze contextual variations in the relative importance of these factors, and develop practical recommendations for optimizing the digital transformation process in logistics management. In the Indonesian context, the adoption of technology in logistics management is becoming increasingly relevant given its geographical characteristics as an archipelagic country with unique connectivity challenges. Digital transformation in logistics has significant potential to overcome physical infrastructure constraints that are often obstacles in logistics operations in developing countries (Utama et al., 2024). In addition, the dominant MSME sector in the Indonesian economy also requires a special approach in the adoption of logistics technology, considering the limited resources and technological capabilities that may be possessed. Considering the complexity and dynamics of technology adoption in logistics management, as well as the urgency of digital transformation in the post-pandemic era, this study aims to conduct a comprehensive Systematic Literature Review (SLR) to identify, analyze, and synthesize the factors influencing technology adoption in logistics management. Through a systematic synthesis of the literature, this research is expected to provide a strong theoretical foundation for the development of effective digital transformation strategies in the context of logistics management, both for industry practitioners and policymakers. In addition, the study also aims to identify gaps in the current literature and suggest directions for future research in this field, thereby contributing to the development of knowledge in the disciplines of logistics management and digital transformation. Based on the background that has been described, this study aims to identify, analyze, and synthesize the key factors influencing the adoption of technology in logistics management through the Systematic Literature Review (SLR)

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approach, so as to produce a comprehensive conceptual framework that facilitates the optimization of the digital transformation process in logistics operations in various organizational and geographical contexts.

RESEARCH METHODS

This study uses the Systematic Literature Review (SLR) method which is an evidence-based approach to identify, evaluate, and interpret research relevant to a specific topic (Belle & Zhao, 2022). SLR was chosen for its ability to provide a comprehensive and transparent synthesis of knowledge through a structured and replicable methodology. This method is particularly suitable for analyzing the factors influencing the adoption of technology in logistics management as it can integrate findings from various empirical studies and identify consistent and contradictory patterns in the literature.

The SLR process in this study was carried out following a protocol adapted from the methodology proposed by (Xiao & Watson, 2019), which includes the following stages:

- **Stage 1**: Identification of Data Sources, In the initial stage, identification is carried out against trusted academic databases relevant to the field of logistics management and information technology. Selected databases include IEEE Xplore Digital Library, Emerald Insight, Science Direct (Elsevier), and SpringerLink. This database was chosen because of its reputation for providing high-quality literature and broad coverage in the field studied.
- **Stage 2:** Search Query Formulation, The search query formulation was built with a focus on "Factors Influencing the Adoption of Technology in Logistics Management". Search strings are developed using relevant keywords and Boolean operators such as "AND" and "OR" to ensure the accuracy and comprehensiveness of search results. Examples of search strings used are: ("technology adoption" OR "digital transformation") AND ("logistics management" OR "supply chain") AND ("factors" OR "determinants" OR "drivers" OR "barriers").
- **Stage 3:** Study Selection Based on Inclusion and Exclusion Criteria, At this stage, an initial screening of the articles obtained based on abstract content and keywords was carried out. Inclusion criteria include: (1) articles published in the 2020-2025 time frame; (2) articles that discuss technology adoption factors in the context of logistics management; (3) peer-reviewed articles in English or Indonesian. Exclusion criteria include: (1) articles that are not available in full text; (2) articles that focus on technical aspects without discussing adoption factors; (3) articles that are not relevant to logistics management.
- **Stage 4:** Quality Evaluation and Data Synthesis, Articles that pass the initial selection are then evaluated for quality using criteria adapted from the CASP (Critical Appraisal Skills Programme) checklist. Data were extracted from selected articles and qualitatively synthesized to identify key themes related to factors influencing the adoption of technology in logistics management. This synthesis is then organized into a conceptual framework that facilitates a comprehensive understanding of the topic being researched.

The process of implementing SLR in this study follows the flow chart shown in Figure 1. The research began by identifying data sources from academic databases, followed by building a search formula, conducting screening based on abstracts and keywords, assessing the feasibility of full-text-based articles, and finally conducting a qualitative synthesis of selected studies.

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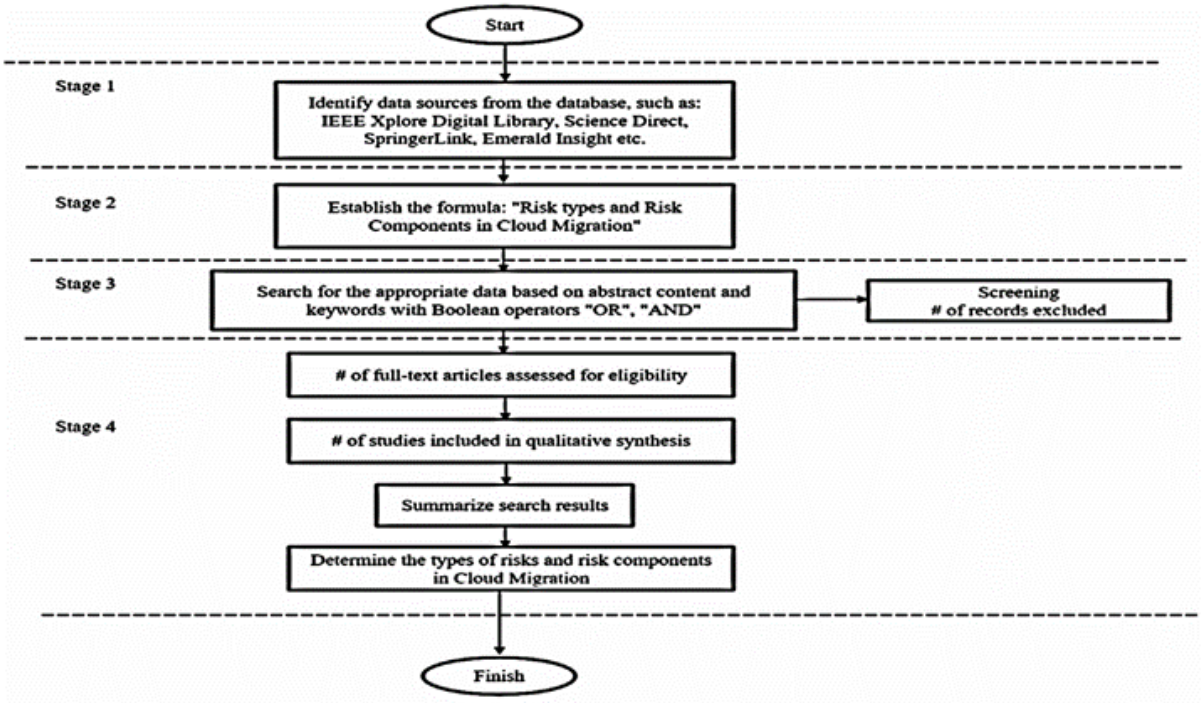

Figure 1. SLR Process Flow Diagram

[SLR diagram from Image 1 showing the process flow from the identification of data sources to the determination of factors influencing the adoption of technology in logistics management]

An initial search yielded a total of 3,100 articles from the four databases used. After going through a gradual screening process, this number was narrowed down to 74 articles that met all the criteria and was used for the final qualitative synthesis, as summarized in Table 1.

Table 1. Distribution of articles based on database sources

No.	Source of Database	#of Paper (stage 1)	Stage 2 (of titles)	stage 3 (of abstract and keyword)	stage 4 (selected for the final review)
1	IEEE Xplore	1866	186	47	15
2	Emerald Insight	54	39	22	15
3	Science Direct-Elsevier	131	74	36	15
4	SpringerLink	1051	301	29	15
	Total	3100	1412	100	60

From the table, it can be seen that for the final synthesis, IEEE Xplore produced a total of 15 articles, Emerald Insight contributed 15 articles, ScienceDirect-Elsevier 15 articles, and SpringerLink 15 articles.

Analysis of the temporal distribution of the articles used in the final synthesis shows a significant trend in the intensity of research on the adoption of technology in logistics management over the past few years, as shown in Figure 2.

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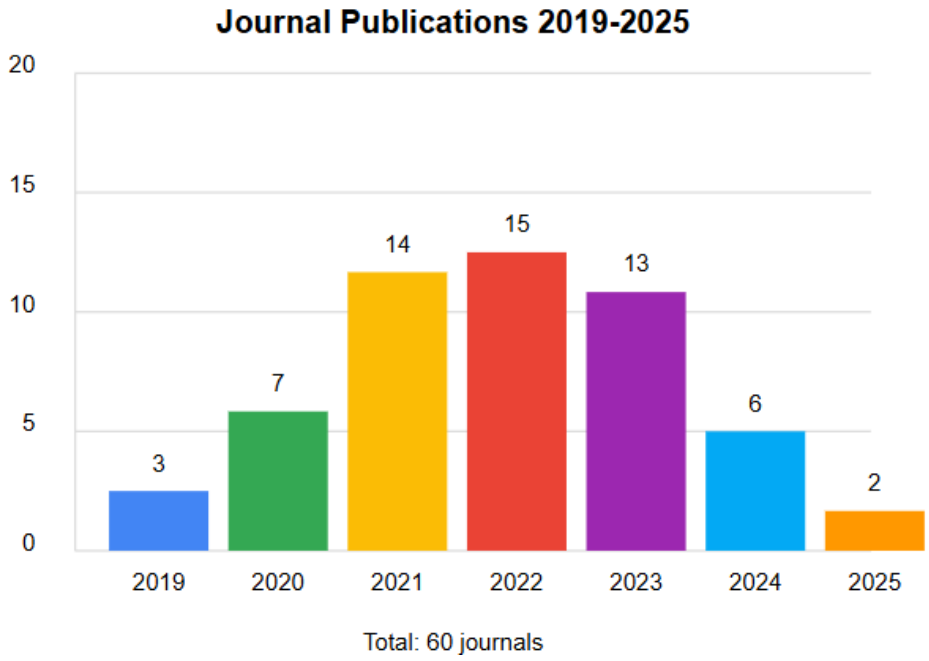

Figure 2. Research Publication Trends (2019-2025)

The graph shows a significant increase in research publications related to the adoption of technology in logistics management from 2019 to 2020, with the peak of publications occurring in 2022-2023. This trend reflects the increasing attention to digital transformation in logistics management, especially driven by the disruption of global supply chains due to the COVID-19 pandemic that forced companies to accelerate the adoption of digital technologies (Salamah et al., 2024). The decline in the number of publications seen in the 2020 period was most likely due to the challenges in conducting empirical research during the early days of the pandemic. However, there has been a resurgence in the following period as the research community adapts to new conditions and the increasing urgency to understand the digitalization process in logistics management (L. Zhang et al., 2024).

Why Is Logistics Management Adopting Technology?

Digital transformation has changed the paradigm in various industry sectors, including logistics management. The adoption of technology in logistics management is driven by several fundamental interrelated factors. First, the increasing complexity of global supply chains requires technological solutions to coordinate various entities and processes within a vast logistics network. This complexity has demanded that companies adopt digital technologies to maintain their competitive advantage in a highly dynamic global market. Second, consumer demands for faster delivery and more responsive services are a significant driver for logistics companies to adopt technologies such as the Internet of Things (IoT), artificial intelligence (AI), big data analytics, and blockchain. These technologies enable companies to improve supply chain visibility, optimize delivery routes, and anticipate customer demand in real-time. As stated, digital transformation in logistics emerged as a strategic response to global economic uncertainty and supply chain disruptions that occurred after the COVID-19 pandemic. Third, the pressure to reduce operational costs while improving efficiency has driven companies to implement automation and data analytics solutions. Technologies such as AI and machine learning enable complex logistics decision-making to be more accurate and efficient, while blockchain offers unprecedented transparency and traceability in the supply chain. The implementation of these technologies offers the potential to optimize logistics processes,

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increase supply chain visibility, reduce human error, and accelerate response times to changing market demand. In addition, the sustainability aspect is also increasingly being considered in the adoption of logistics technology. Supply chain digitalization not only aims to improve operational efficiency, but also to reduce environmental impact through route optimization, waste reduction, and energy efficiency improvement. In the context of Indonesia as an archipelagic country, digital transformation in logistics has significant potential to overcome physical infrastructure constraints that are often obstacles in logistics operations.

Table 2. Distribution of Articles Per Year

Year	2019	2020	2021	2022	2023	2024	2025
Number	3	7	14	15	13	6	2
Percent	5%	12%	23%	25%	22%	10%	3%

RESULTS AND DISCUSSION

Digital Transformation in Logistics Management Optimization

Digital transformation has become a fundamental catalyst in the evolution of contemporary logistics management, with technology acting as a strategic lever to improve operational efficiency, sustainability, and business competitiveness (Sharma & Yadav, 2024; S. Zhang et al., 2025). In recent years, the adoption of digital technologies such as the Internet of Things (IoT), Blockchain, Artificial Intelligence (AI), and Big Data Analytics (BDA) has significantly changed the entire supply chain operational landscape (Mohsen, 2023; Rejeb et al., 2020). While the benefits of logistics digitalization have been widely recognized, its implementation faces a variety of multidimensional challenges, especially in developing countries (Caliskan et al., 2024; Obiri-Yeboah et al., 2025). Key factors influencing the successful adoption of technology in logistics management include three main pillars: technology, people, and processes, which need to be supported by adequate IT infrastructure and a conducive digital culture (Aamer et al., 2023). Recent research also indicates that top management support, digital capabilities, and leadership aspects are important determinants in the success of digital transformation, especially in SMEs (Talii & Chroqui, 2022). The integration of digital technology with sustainability initiatives (green initiatives) is also increasingly the main focus in creating a supply chain that is not only efficient but also sustainable (Hamdy, 2024; Margherita et al., 2024). This systematic review aims to identify critical factors influencing the adoption of technology in logistics management to optimize the digital transformation process. As shown in Table 3, a synthesis of 60 recent studies on the factors influencing the adoption of technology in logistics management identifies several crucial elements that determine the success of digital transformation in the context of supply chains. This table maps the various dimensions of research ranging from the role of specific technologies such as IoT, Blockchain, and Big Data Analytics to organizational and environmental factors that facilitate or hinder the digitalization process (Aamer et al., 2023; Raj et al., 2023). The data in the table shows that the successful implementation of digital technology does not depend solely on technology infrastructure, but is also significantly influenced by managerial aspects, human resource capabilities, and stakeholder support (Sarker & Klungseth, 2025).

Table 3. Related articles on factors influencing the adoption of technology in logistics management

Yes	Research Scope	Author (Name & Year)	Conclusion

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1	The role of digital transformation in green supply chains and supply chain resilience	(Hamdy, 2024)	Digital transformation plays an important role in GSCM, increasing the agility and resilience of the supply chain, and being affected by the uncertainty of COVID-19.
2	The impact of digital technology on modern supply chain management	(Mubarik & Khan, 2024)	Digital technologies strengthen the resilience, visibility, and sustainability of the supply chain; its adoption faces human resources and regulatory challenges.
3	Digitalization in reverse logistics	(Alimohammadi & Behnamian, 2023)	Digital transformation is greatly impacting reverse logistics; Integration of a digital-based decision system is required.
4	Information technology and supply chain competitive advantage	(Hua et al., 2023)	IT strengthens supply chain agility; Key factors include IT infrastructure, system integration, and GIS design.
5	Obstacles to digital transformation in Indonesia's CPO industry	(Pasaribu et al., 2025)	It found 22 major barriers in 7 categories to the adoption of Industry 4.0 in the palm oil supply chain in Indonesia.
6	Digital transformation in logistics companies	(Li, 2025)	Organizational change and resource sharing are key in supporting digital-based supply chain efficiency.
7	Digital supply chain transformation in SMEs vs large companies	(Ngo et al., 2023)	TOE (technology, organization, environment) factors influence the adoption of digitalization; SMEs are more driven by the risk of disruption.
8	Digital transformation strategy and corporate financial performance	(Fang et al., 2023)	Digital transformation strategies improve strategic agility and financial performance through connectivity and data analytics capabilities.
9	Adoption of IoT in the digital supply chain	(Samaranayake et al., 2023)	The integration of IoT systems and infrastructure is a key factor for adoption; Customer demand is the most important indicator.
10	Lean Six Sigma integration and supply chain digitization	(Tay & Loh, 2022)	The DMAIC model can be improved with big data to systematically improve supply chain performance.

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11	The role of leadership and digital capabilities in SMEs	(Obiri-Yeboah et al., 2025)	Digital capabilities and leadership increase supply chain resilience; Resilience is a mediator of viability.
12	Big Data Analytics on retail logistics in the UK	(Ali & Essien, 2023)	BDA strengthens outbound logistics efficiency; The benefits of technology and top management support are decisive for adoption.
13	Additive manufacturing in Australian medical devices	(Chowdhury et al., 2024)	The combination of resilience and challenge reduction strategies is important for AM-based digital transformation.
14	Blockchain and post-pandemic supply chain transformation	(Raj et al., 2023)	The main drivers of digital transformation are technological and organizational factors; finance and regulation play less of a role.
15	5PL operating model based on digital transformation	(Nicoletti & Appolloni, 2024)	The 5PL operating model requires digital collaboration between stakeholders as well as protection through cybersecurity and blockchain.
16	Key obstacles to Logistics 4.0 in developing countries	(Caliskan et al., 2024)	Managerial and financial challenges are the main obstacles to the transformation of Logistics 4.0; This study compiles a mitigation roadmap.
17	The relationship between inventory flexibility and digital transformation	(Zhu et al., 2024)	Digitalization reinforces the positive impact of inventory flexibility on productivity; Supply chain concentration also strengthens this effect.
18	Factors of the digital transformation of the supply chain	(Aamer et al., 2023)	Three main pillars: technology, people, and processes; supported by IT infrastructure and digital culture.
19	Adoption of Industry 5.0 drones in the food supply chain	(Mahroof et al., 2024)	The adoption of drones is driven more by the potential of net production than by predictive functions; There is a need to increase awareness of its use.
20	Framework for implementing digital transformation in the food supply chain	(S. Wang et al., 2024)	The use of a combination of IoT, BDA, and Cloud Computing can enhance digital transformation in the food supply chain.
21	The use of Blockchain, NFTs, and sentiment analysis in the supply chain	(B et al., 2025)	Digitization through NFTs and blockchain improves transparency, product tracking, and customer engagement in the supply chain.

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22	Digital maturity and the success of digital transformation across industries	(Sarker & Klungseth, 2025)	The level of digital maturity is directly related to the success of the transformation, depending on the support of human resources and business model innovation.
23	Corporate supply chain resilience post-COVID-19 through digitalization	(Z. Wang et al., 2024)	Digital transformation increases supply chain resilience, especially in non-state-owned enterprises and high-tech non-industries.
24	Data-driven technology bibliometric mapping in the supply chain	(Baziyad et al., 2024)	IoT and CPS are central topics but are still in their infancy; Further research is needed for theoretical and practical development.
25	Selection of digital technology for circular supply chain	(Tanveer et al., 2023)	CPS and IoT are superior to Cloud Manufacturing and BDA in supporting the circular economy in SMEs.
26	Digital maturity model for supply chain transformation	(Tiss & Orellano, 2023)	Multidimensional models to objectively assess digital maturity help companies build roadmaps to Supply Chain 4.0.
27	Blockchain and Big Data in supply chain design	(Sundarakani et al., 2021)	Blockchain is effective in reducing carbon and physical paperwork, improving the efficiency and transparency of global logistics.
28	Machine learning and big data in supply chain decision-making	(Patnayak et al., 2023)	Machine learning accelerates big data-driven decision-making, which is highly relevant in today's competitive marketplace.
29	Blockchain to address logistics and supply chain challenges	(Aslam et al., 2025)	Blockchain features such as transparency and information security are effective in solving the challenges of decentralization and digitalization.
30	Success factors for the adoption of Big Data in Morocco's transportation/logistics sector	(Talii & Chroqui, 2022)	The role of LSPs and management support are key factors in the adoption of Big Data Analytics in Morocco's logistics sector.
31	The development of digital technologies and their impact in SCM	(Mohsen, 2023)	Technologies such as IoT, blockchain, AI, and the cloud are significantly changing supply chain operations as a whole.
32	Digital supply chain integration and operational performance improvement	(Sharma & Yadav, 2024)	Five dimensions of SC performance enhanced by digitalization: reliability, agility, cost, responsiveness, and asset utilization.

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33	Digital transformation and green operations in the ceramic industry	(Margherita et al., 2024)	The integration of digital and green initiatives significantly drives sustainability and ESG performance in operational management.
34	Digitalisation of Malaysia's logistics and transport sector	(Kafi et al., 2022)	Digitalization is still at a basic level; The synergy between digital strategies and industrial transformation needs to be strengthened.
35	The influence of GSCM on manufacturing performance through digital transformation	(Tiwari et al., 2025)	Organizational, social, and technological factors play a key role in the success of digital-based GSCM.
36	Integration of Industry 4.0 & 5.0 in logistics	(Monferdini et al., 2025)	Industry 5.0 adds a human-centric element to digital logistics, essential for sustainability and operator convenience.
37	Digital transformation and corporate ESG performance	(Hu & Song, 2024)	Digitalization improves internal transparency and operational efficiency, thus positively impacting ESG performance.
38	Digitalization, resilience, and supply chain performance	(Zhao et al., 2023)	Digitalization strengthens responsiveness and recovery capabilities in the supply chain, which has a direct impact on performance.
39	AI, Blockchain & IoT integration for logistics decarbonization	(Mishra et al., 2024)	Modular strategies and interoperability are important in addressing the paradoxical challenges of integrated technologies for sustainability.
40	AI and omnichannel integration in healthcare logistics	(Abadie et al., 2023)	AI adoption must be supported by organizational resources and employee engagement to realize effective omnichannel integration.
41	IoT research trends in SCM and logistics for 2 decades	(Rejeb et al., 2020)	IoT focus in SCM includes RFID, reverse logistics, and Industry 4.0 technologies; relevant for various industries such as food and pharmaceuticals.
42	Blockchain adoption enabler for sustainable logistics	(Sangode, 2024)	Transparency and decentralization are the main drivers in blockchain's success in green logistics.
43	IoT in port logistics and practical implications	(Rajak et al., 2024)	IoT adoption is determined by technological readiness and sustainability; A special approach is

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			needed for both large and small ports.
44	Big Data-based supply chain management mechanism	(Huang, 2023)	A collaborative approach and process redesign are needed for risk mitigation in big data-based supply chain parts.
45	Digitalization initiatives for sustainable logistics 4.0	(Parhi et al., 2022)	Technology infrastructure, top management commitments, and government policies are the main drivers of the success of sustainable logistics 4.0.
46	Digitalization factors for logistics company SCM	(Xiao & Watson, 2019)	Investment in digital facilities and R&D personnel significantly improved cash flow management and logistics efficiency.
47	Social barriers in digitalization and sustainable innovation in SCM	(Singh & Maheswaran, 2024)	Job disruption and lack of digital skills are major social barriers that need to be addressed through training.
48	Digital transformation path to supply chain resilience	(Yin, 2023)	The combination of the depth and breadth of digital transformation, R&D expenditure, and company size affects the level of resilience.
49	Barriers to digitization of SCM based on SDGs	(Dixit & Malviya, 2024)	The most dominant administrative obstacle has a major impact on the achievement of SDG 12 (responsible consumption and production) and SDG 17.
50	The effect of supply chain digitalization on company competitiveness	(S. Zhang et al., 2025)	Supply chain digitalization increases operational efficiency and technological innovation, especially in non-state-owned companies.
51	Strategy for the integration of digital technology and old technology in manufacturing	(Cheng & Cui, 2024)	Four digitalization strategies (searching, enhancing, grafting, integrating) depend on the perception of usability and distance of the technology used.
52	Success factors for digitizing automotive supply chains for sustainability	(Dixit & Malviya, 2024)	Collaboration between supply chain actors and alignment of company and supplier goals is the key to the success of digital transformation.
53	Circular economy and sustainable pharmaceutical logistics through digitalization	(Alimohammadi & Behnamian, 2024)	The blockchain- and CC-based pharmaceutical reverse logistics model drives efficiency, sustainability, and savings in the country's foreign exchange.

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54	German SME strategy in digital supply chain transformation	(Birkel & Wehrle, 2024)	Three approaches to SMEs in digitalization were found; Lack of explicit strategy and management leadership is the main obstacle.
55	Performance evaluation of cross-industry digital transformation (Asia-Europe case)	(Gillani et al., 2024)	The differences between Europe and Asia regarding digital readiness affect the timing and impact of the digital transformation adopted.
56	The role of digital ecosystems in e-commerce logistics	(Li, 2025)	The collaboration and interoperability of digital e-commerce systems improve response speed and customer satisfaction.
57	The effect of digital transformation on urban logistics productivity	(Liu et al., 2024)	Digital technology improves route planning and delivery efficiency in urban-logistics environments through data-driven algorithms.
58	The role of AR and VR in digital-based logistics training	(Tetteh et al., 2024)	AR and VR accelerate logistics training and reduce operational errors, especially in warehouse management.
59	Digital transformation challenges in emerging markets	(S. Zhang et al., 2025)	Weak digital infrastructure and a lack of supportive regulations are the main challenges to the adoption of digital technology.
60	The influence of predictive technology on inventory management	(Alimohammadi & Behnamian, 2023)	Predictive technologies such as AI and data analytics improve inventory efficiency and reduce stock-out and overstock costs.

Digital transformation has become a major catalyst in changes in the structure and performance of logistics management. Based on the results of a synthesis of 60 international and national journals, it can be concluded that the adoption of digital technology and improvements in logistics management practices are the two main factors influencing the effectiveness of digital transformation in the logistics sector. Technology adoption is the key foundation that enables efficiency, transparency, and agility in the supply chain. Technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Big Data Analytics (BDA), Blockchain, and Cloud Computing (CC) have shown significant contributions in accelerating information flow, process automation, and data-driven decision-making. For example, research from Wang et al. (2024) and Mishra et al. (2024) underscores the importance of integrating IoT and AI in improving supply chain visibility and efficiency, especially in the context of food supply chains and sustainable logistics. This technology not only improves operational efficiency but also strengthens the resilience of the supply chain to disruption. However, the adoption of technology is not without obstacles. Studies by Caliskan et al. (2024) and Dadsena & Pant (2023) show that managerial, financial, and regulatory barriers are still significant barriers, especially in developing countries. These barriers cast doubt on the readiness of

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organizations to embrace digital change. Other challenges include lack of technical skills, internal resistance, and lack of integration between old and new systems (Cheng & Cui, 2024).

On the other hand, logistics management is transforming along with digital adoption through the implementation of new concepts such as green supply chain management (Hamdy, 2024), digital-based reverse logistics (Alimohammadi & Behnamian, 2023), and omnichannel integration (Abadie et al., 2023). This transformation is not only about efficiency but also about sustainability and customer service. Lean digital logistics practices, as described by Tay & Loh (2022), drive the integration of technology into the DMAIC Lean Six Sigma approach, creating synergies between process improvement and digital innovation. From the organizational strategy dimension, factors such as top management support (Ali & Essien, 2023), collaboration between supply chain actors (Dixit & Malviya, 2024), and digital innovation culture (Aamer et al., 2023) also influence the success of digital transformation. The combination of technological readiness, competent human resources, and adaptive organizational strategies and structures is the key to success in the application of digital technology in logistics. These studies show that the influence of digitalization is not linear, but rather depends on the proper configuration between the internal and external factors of the company. For example, Yin (2023) shows that the combination of the depth of digital transformation, R&D spending, and company size determines the resilience capabilities of supply chains. To provide a more systematic mapping of the findings, the following is presented a categorization table based on two main dimensions, namely technology adoption and logistics management.

Table 4. Categorization of Technology Adoption and Logistics Management Factors

Yes	Category	Description	Reference	Weight
1	Technology	Use of digital technologies (IoT, AI, Blockchain, BDA, Cloud, CPS) for efficiency, visibility, and agility	Wang et al. (2024), Sharma & Yadav (2024), Mishra et al. (2024), Mubarik & Khan (2024), Monferdini et al. (2025), Tanveer et al. (2023), Patnayak et al. (2023), Xiao (2023), Mohsen (2023), Aslam et al. (2025), Sundarakani et al. (2021), Zhang et al. (2025), Rejeb et al. (2020), Chowdhury et al. (2024), Baziyad et al. (2024)	25%
2	Organization	Structure, organizational culture, resistance to change, role of collaboration and digital leadership	Dadsena & Pant (2023), Li (2025), Sarker & Klungseth (2025), Nicoletti & Appolloni (2024), Dixit & Malviya (2024), Raj et al. (2023), Hu & Song (2024), Margherita et al. (2024), Birkel & Wehrle (2024), Talii & Chroqui (2022), Aamer et al. (2023), Sharma & Yadav (2024), Kafi et al. (2022), Fang et al. (2023)	20%
3	TBSP	Workforce readiness, restraining, digital leadership, and technology adoption by employees	Tiss & Orellano (2023), Singh & Maheswaran (2024), Sarker & Klungseth (2025), Yin (2023), Gillani et al. (2024), Aamer et al. (2023), Abadie et al. (2023), Obiri-Yeboah et al. (2025), Mahroof et al. (2024), Sangode	15%

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			(2024), Yang et al. (2021), Rajak et al. (2024), Parhi et al. (2022)	
4	Cost	Cost of investment in technology, infrastructure, training, and financial limitations on digitalization	Caliskan et al. (2024), Radi et al. (2024), Zhu et al. (2024), Pasaribu et al. (2025), Kumar Dadsena & Pant (2023), Tanveer et al. (2023), Alimohammadi & Behnamian (2024), Xiao (2023), Mahroof et al. (2024), Parhi et al. (2022)	10%
5	System Integration	Integration of old systems with new (legacy systems), ERP, Lean Six Sigma, collaborative digital platforms	Cheng & Cui (2024), Tay & Loh (2022), Baziyad et al. (2024), Alimohammadi & Behnamian (2023), Sharma & Yadav (2024), Mubarik & Khan (2024), Hu & Song (2024), Patnayak et al. (2023), Rejeb et al. (2020), Obiri-Yeboah et al. (2025), Kafi et al. (2022), Monferdini et al. (2025)	15%
6	Mixture	Studies with cross-category discussions: technology and organization, or technology and human resources simultaneously	Margherita et al. (2024), Abadie et al. (2023), Ziyu Wang et al. (2024), Samaranayake et al. (2023), Ngo et al. (2023), B. Symeonidis & Antoniou (2025), Hamdy (2024), Alimohammadi & Behnamian (2023), Fang et al. (2023), Chowdhury et al. (2024)	15 %

Implications of Technology Adoption on Future Logistics Management

Based on a synthesis of 60 journals in the field of digital transformation and logistics management, there are a number of important implications for future research. First, technological developments such as Artificial Intelligence (AI), Internet of Things (IoT), blockchain, and big data analytics will further open up research opportunities on the holistic integration of digital systems throughout the supply chain. Future research can explore technology implementation models that are more adaptive to organizational characteristics, such as business scale, human resource readiness, and logistics network structure. Second, the issue of sustainability and green logistics associated with digitalization is a challenge as well as a new opportunity, especially in the context of circular supply chains and reverse logistics. Third, the need for a multidisciplinary approach in examining the interaction between organizational factors, technology, and the external environment will strengthen understanding of the dynamics of technology adoption. In addition, with increasing global disruptions such as pandemics or geopolitical crises, future research can also focus on the role of technology in building long-term supply chain resilience. Thus, the results of this study open up a broad new direction for the development of sustainable and strategic digital transformation theories and practices in the field of logistics.

Conclusion

Based on a systematic literature review of 60 journals on the factors influencing the adoption of technology in logistics management, it can be concluded that digital transformation has become a fundamental catalyst in the evolution of contemporary logistics management. The adoption of digital technologies such as the Internet of Things (IoT), Blockchain, Artificial Intelligence (AI), Big Data Analytics (BDA), and Cloud Computing has significantly changed

the overall supply chain operational landscape. Key factors influencing the success of technology adoption in logistics management include three main pillars: technology, people, and processes, which need to be supported by adequate IT infrastructure and a conducive digital culture. Top management support, digital capabilities, and leadership aspects are also important determinants in the success of digital transformation, especially for SMEs. The integration of digital technology not only improves operational efficiency but also strengthens the resilience of the supply chain to disruption. However, technology adoption still faces various obstacles such as managerial, financial, and regulatory challenges, especially in developing countries. Lack of technical skills, internal resistance, and poor integration between old and new systems are also significant barriers. In the practical dimension, logistics management is transforming through the application of new concepts such as green supply chain management, digital-based reverse logistics, and omnichannel integration that focuses not only on efficiency but also on sustainability and customer service. The study also identified that the right combination of the depth of digital transformation, R&D spending, and company characteristics determines the level of supply chain resilience. Collaboration between supply chain actors and alignment of corporate goals is key to the success of digital transformation, while the integration of digital initiatives with sustainability initiatives (green initiatives) is increasingly the main focus in creating a supply chain that is not only efficient but also sustainable. For future development, multidisciplinary research that examines the interaction between organizational factors, technology, and the external environment will strengthen understanding of the dynamics of technology adoption, especially in building supply chain resilience in the midst of increasing global disruptions such as pandemics or geopolitical crises.

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