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INTELLIGENT MANAGEMENT SYSTEMS IN INTERNATIONAL TRADE: AI-DRIVEN TRANSFORMATION OF ORGANIZATIONAL PROCESSES

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ABSTRACT

Purpose: *The purpose of the study is to evaluate how AI-driven intelligent management systems transform operational processes in international trade organizations, with a specific focus on measurable improvements in decision-making efficiency and operational performance.*

Need for the study: *Despite growing AI implementation in supply chain management, significant knowledge gaps exist regarding how these technologies transform organizational processes in international trade. Research lacks comprehensive empirical studies documenting specific process-level transformations and their operational impacts.*

Methodology: *This research combines comparative analysis and multiple case study methodology to examine how artificial intelligence transforms supply chain management processes in international trade. The comparative framework evaluates seven critical management domains with and without AI augmentation, while case studies of Amazon and Maersk provide real-world evidence of implementation approaches and outcomes.*

Findings: *AI-driven supply chain management creates measurable advantages in three critical areas: predictive capabilities replace reactive approaches in demand planning, enabling anticipatory inventory positioning; intelligent logistics systems continuously optimize routing and resource allocation despite disruptions; and new relationship dynamics emerge between supply chain partners, shifting from transactional exchanges toward data-sharing collaborations that enable network-wide optimization.*

Practical Implications: *Organizations should implement intelligent supply chain management by starting with targeted applications before progressing to more advanced implementations. Successful approaches involve progressive capability development, beginning with smaller-scale implementations before scaling to larger operations. Organizations should prioritize implementations in areas showing significant transformation potential: data analysis and forecasting, logistics optimization, and risk management, while establishing appropriate governance measures for compliance and data ethics.*

Keywords: AI; artificial intelligence; intelligent supply chain management; cognitive supply chains; international trade
Jel codes: F10; M11; O32

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1. INTRODUCTION

Supply chain management in international trade is experiencing a fundamental shift as artificial intelligence technologies transform traditional approaches into intelligent systems capable of autonomous operations and predictive optimization. As global trade volumes continue to expand, organizations increasingly recognize that supply chain efficiency and resilience are critical determinants of competitive advantage in international commerce (Toorajipour et al., 2021).

This evolution to intelligent supply chain management (ISCM) responds to mounting challenges of market volatility, geopolitical tensions, and heightened consumer expectations that traditional models struggle to address effectively. While cognitive supply chain adoption accelerates across industries, there remains a significant gap in understanding how these technologies specifically transform operational processes and deliver measurable benefits (Ivanov & Dolgui, 2020).

Despite growing recognition of AI's potential value, current research predominantly focuses on theoretical potential rather than empirical outcomes, with limited systematic process-level analysis of AI implementation effects (Baryannis et al., 2019). Additionally, while numerous studies address technological aspects of AI in supply chains, fewer examine the organizational and operational dimensions of transformation (Dubey et al., 2020).

This research aims to evaluate how AI-driven intelligent management systems transform operational processes in international trade organizations, with a specific focus on measurable improvements in decision-making efficiency and operational performance. By developing a comprehensive comparative framework that systematically assesses transformations across key supply chain processes, the study provides empirical evidence of AI's effects on international trade.

To achieve this purpose, the study employs a mixed-methods approach combining comparative analysis of process capabilities with case study methodology, guided by two primary research questions:

1. How do AI-powered intelligent management systems transform specific supply chain processes compared to traditional approaches?
2. What measurable improvements in operational efficiency, decision quality, and risk management result from these transformations?

The significance of this research lies in its contribution to both theoretical understanding and practical implementation of AI in global supply chains, offering organizations a systematic framework for evaluating and implementing AI-driven transformations in international trade operations.

2. LITERATURE REVIEW

Over the last two decades, research on supply chain management (SCM) has advanced from basic linear models toward integrated, digitally enabled networks that embrace global complexity and dynamic collaboration (Mohsen, 2023; Nayak & Choudhary, 2022). Early writings tended to describe supply chains as discrete sets of sequential processes, with limited attention to the systemic interconnections that stretch across borders and stakeholder communities (Carter & Rogers, 2008; Seuring & Müller, 2008). Subsequently, growing recognition of interdependencies at each stage – from sourcing raw materials to delivering goods to end customers – spurred frameworks stressing coordination, trust, and visibility. The emergence of Industry 4.0 further catalyzed the transition by introducing new information and communication technologies, including sensors, cloud platforms, and robotics (Richey & Davis-Sramek, 2022).

Artificial intelligence plays an essential role in this evolution. It initially appeared as rule-based expert systems and fuzzy logic, helping to automate routine operational tasks (Hartmann & Moeller, 2014). With the rise of big data and powerful computing infrastructure, AI grew more sophisticated, relying on machine learning, deep learning, and advanced predictive models (Mohsen, 2023; Muthuswamy & M. Ali, 2023). These paradigms allowed practitioners to move beyond static or descriptive analytics and embrace predictive and prescriptive functionalities (Wamba & Queiroz, 2020). AI, in effect, started to close the gap between data collection and actionable insights, enabling faster reaction times for disruptions, changes in consumer demand, and emerging opportunities (Pournader et al., 2021).

International supply chains arguably benefit the most from AI-driven insights because of the inherent complexities of cross-border flows (Mohsen, 2023; Pan & Nishant, 2023). Variations in

regulations, cultural practices, and infrastructure can hinder seamless coordination among trading partners. Scholars highlight that AI-based solutions – particularly those integrated with blockchain or the Internet of Things (IoT) – help mitigate some of these complexities by standardizing the exchange of real-time data, automating compliance verifications, and improving operational transparency (Budhwar et al., 2023; G V Radhakrishnan, 2025; Treiblmaier & Garaus, 2023). Indicate how logistics providers have deployed AI-enabled tracking systems that feed data into predictive analytics models, revealing early signals of disruptions like port closures or environmental calamities (Brau et al., 2024; Camargo et al., 2020). Such systems produce granular recommendations for route diversions or dynamic sourcing, effectively reducing lead times and strengthening overall resilience (Cannas et al., 2024; Dey et al., 2024).

Researchers increasingly emphasize the shift from simple decision support systems to intelligent supply chain management. Unlike traditional tools in which humans interpret diagnostic dashboards, ISCM features learning algorithms and autonomous capabilities that enable real-time interventions (Nayak & Choudhary, 2022). Inventory levels, transportation routing, and capacity planning can all be recalibrated by AI routines designed to continuously learn from data on sales forecasts, production constraints, and macroeconomic indicators (Mohsen, 2023). However, the literature shows that successful adoption depends on consistent human oversight for high-stakes decisions such as prioritizing shipments during crises, managing ethical or compliance dilemmas, and balancing productivity with workforce well-being (Dwivedi et al., 2024; G V Radhakrishnan, 2025; Qu & Kim, 2024).

Parallel to advances in AI, the digital transformation of supply chains has spurred widespread adoption of IoT-based systems. IoT sensors on shipping containers, warehouse shelves, and production lines transmit data on temperature, humidity, location, or handling conditions in near real time(G V Radhakrishnan, 2025). Such connectivity is particularly useful in global contexts where products may pass through multiple checkpoints with varying storage requirements, including cold chain logistics for perishable goods (Qu & Kim, 2024). AI analytics then process these data streams to forecast potential issues, detect irregularities, and optimize distribution schedules. For instance, computer vision tools can scan pallets for damage or tampering, automatically prompting re-routing or reordering decisions (Zhang et al., 2024). This automation of detection and response drastically lowers error rates and fosters a proactive, rather than reactive, approach to risk management (Pan & Nishant, 2023).

Blockchain solutions add another dimension by establishing secure, tamper-evident ledgers for each step in the supply chain (Treiblmaier & Garaus, 2023). While blockchain itself is not AI, integrating the two can create intelligent contracts that trigger payments or shipping authorizations when certain sensor conditions are met (Dwivedi et al., 2024; Kshetri, 2023; Richey et al., 2023). This convergence demonstrates how Industry 4.0 technologies collectively reinforce one another, forming a comprehensive digital ecosystem. According to Mohsen (2023), companies that exploit these synergies report lower inventory costs, better demand visibility, and improved customer satisfaction – though the scale of returns varies across industries and regions. Indeed, researchers note the persistent challenges: data sharing across borders often faces regulatory hurdles, uneven telecom infrastructure hinders IoT's effectiveness, and cultural factors may impede technology acceptance (Hendriksen, 2023; Pan & Nishant, 2023).

On the performance side, organizations adopting AI-based systems typically achieve gains in forecasting accuracy, procurement agility, and logistics optimization, but additional empirical research is needed to measure these outcomes systematically (Ozturk, 2024). Randomized trials and large-scale comparative studies remain relatively scarce, yet anecdotal evidence suggests AI's ability to handle large, messy datasets gives it an edge over traditional forecasting or optimization tools (Belu, 2025; Camargo et al., 2020). In practice, managers often rely on hybrid approaches, blending algorithmic recommendations with domain expertise. This synergy preserves human judgment in negotiations with suppliers, strategic decisions about product portfolios, and addressing ethical challenges (Carter & Rogers, 2008; Dwivedi et al., 2024; Seuring & Müller, 2008).

The research in AI-based supply chain management shows strong momentum. The push toward generative AI and large language models suggests new possibilities for analyzing unstructured data – such as social media posts, remote sensing, or weather forecasts – to anticipate disruptions and refine risk models (Brau et al., 2024). Managers can receive proactive alerts, complete with recommended action sequences, resulting in supply chains that respond dynamically to unforeseen shocks (Merlino & Sproģe, 2017; Richey & Davis-Sramek, 2022). Scholars caution, however, that expansion into

generative models also raises ethical and privacy concerns if data usage is insufficiently regulated (Budhwar et al., 2023). Maintaining transparency in algorithmic decision-making can be difficult when models become more sophisticated and opaque (Dwivedi et al., 2024).

In sum, the literature converges on a view that AI has fundamentally altered how global supply chains operate, driving them toward a model of intelligent, collaborative networks. The transformation is incomplete, as organizations still face hurdles around data governance, infrastructure readiness, and social acceptance of automation, especially in cross-border contexts. Nonetheless, mounting evidence indicates that properly implemented AI yields substantial improvements in agility, cost efficiency, and risk mitigation. Future investigations require robust comparative frameworks to evaluate performance and sustainability outcomes across various cultural and regulatory landscapes. The literature suggests ongoing technological integration – linking AI, IoT, blockchain, and advanced analytics – while underscoring the enduring relevance of human oversight in intelligent and ethically sound supply chain ecosystems.

3. METHODOLOGY

3.1. Research Approach and Analytical Framework

This research employs a qualitative case study approach to examine the transformational impact of artificial intelligence on international supply chain management processes. Given the emergent nature of AI applications in global supply chains, case studies provide an appropriate methodological framework to capture the complex, multifaceted changes occurring across organizational processes and capabilities within international trade contexts.

The research design centres on comparative analysis that contrasts conventional supply chain management processes with their AI-enhanced counterparts. This approach enables identification of transformational patterns across specific functional areas including demand forecasting, inventory optimization, logistics management, and regulatory compliance. Rather than attempting broad technological generalizations, the study focuses on process-level transformations to capture nuanced changes in operational capabilities, decision-making frameworks, and organizational outcomes.

Data sources for this research comprise publicly available information including company publications, annual reports, industry analyses, and research reports. A systematic comparative framework has been developed to evaluate supply chain processes with and without AI augmentation, identifying critical operational differences and capability enhancements across the international supply chain spectrum. Supporting evidence is drawn from reports produced by research organizations including McKinsey, Precedence Research, KBV Research, and Polaris Research, OECD, and WTO to establish broader market trends and adoption patterns. However, the core empirical foundation consists of case studies of Amazon and Maersk as exemplars of AI implementation in international supply chains.

The selection of Amazon and Maersk as focal organizations is methodologically significant for several reasons. Both companies represent industry leaders with global operational scale and documented commitment to technological innovation. Historically, both organizations were early adopters of digital transformation, implementing enterprise systems and digital documentation well before industry-wide adoption. This pattern of technological leadership suggests their current AI implementations may foreshadow broader industry trends. Furthermore, these organizations operate in complementary segments of global supply networks – Amazon primarily in e-commerce fulfillment and Maersk in maritime shipping and transportation – providing valuable comparative insights across different supply chain management. Their relative size and market influence also means their technological choices often establish de facto standards that shape subsequent industry adoption patterns. The analytical framework employs process-level comparison to evaluate transformation across standardized dimensions, examining how artificial intelligence supports decision-making and improves performance outcomes.

3.2. Research Limitations

This research methodology faces several significant limitations that warrant explicit acknowledgment. First, quantitative assessment is substantially constrained by data availability limitations. Organizations

typically do not disclose specific performance metrics related to AI implementations in their public reporting, instead using qualitative descriptors of improvement or general statements about enhanced productivity. Annual reports and investor communications describe AI impacts in broad terms of 'improved efficiency' or 'enhanced capabilities' without providing precise measurements of cost savings, productivity improvements, or other quantifiable benefits. This limitation necessitates the case study approach but restricts the ability to make definitive quantitative claims about performance improvements.

Second, measuring AI's specific impact on supply chain processes presents unique methodological challenges beyond typical technology evaluation difficulties. AI systems often function as integrated components within complex organizational ecosystems, making it difficult to isolate their specific contribution from other concurrent technological and process innovations. The 'black box' nature of many machine learning algorithms further complicates assessment, as the relationship between inputs and outputs is not always transparent. Additionally, AI implementations typically evolve continuously as algorithms learn from new data, making point-in-time measurements less meaningful than they might be for static technologies.

Third, the field currently lacks standardized, universally accepted metrics for measuring AI's economic impact on trade and supply chain operations. While potential benefits are widely acknowledged, methodologies for isolating and quantifying AI's specific contribution remain underdeveloped. This measurement challenge reflects both the nascent state of widespread AI implementation and the inherent complexity of separating technological effects from other organizational and market factors in international trade that span multiple regulatory environments, transportation modes, and stakeholders. To demonstrate the development of intelligent supply chain management, changes in the cognitive supply chain market compared to global merchandise and services exports are presented.

Fourth, the case-based approach provides valuable insights into industry-leading implementations but inherently constrains generalizability. Amazon and Maersk's scale, resources, and technological sophistication exceed those of most market participants, potentially limiting the direct applicability of their experiences to smaller organizations or different industry segments. Their ability to invest in proprietary AI development and integration may create implementation pathways that aren't feasible for organizations with more constrained resources or technical capabilities.

Fifth, the cross-sectional nature of the research provides limited insight into the longitudinal evolution of AI capabilities and their impact over time. AI systems continuously learn and adapt, potentially delivering different benefits as they mature and as organizations develop complementary capabilities. This dynamic aspect of AI implementation is difficult to capture through the methodology employed in this study.

Despite these significant limitations, the case study approach represents an appropriate methodological response to the current state of AI implementation in international supply chains management. By focusing on process-level transformations rather than attempting precise quantification of benefits, the research provides valuable insights into how AI is reshaping operational capabilities and strategic positioning within global trade system. The historical pattern of technology diffusion from industry leaders to broader adoption suggests the experiences of Amazon and Maersk may offer meaningful indicators of future industry trajectories, even as implementation approaches are adapted to diverse organizational environments.

4. RESULTS

4.1. Trends in International Trade and Cognitive Supply Chain Market

Analysis of trends in international trade highlights the substantial growth of the cognitive supply chain market. Figure 1 illustrates the relationship between global exports (both merchandise and services) and the cognitive supply chain market from 2017 to 2024. The data reveals that while international trade has experienced moderate growth with some fluctuations – particularly the notable decline during 2020 due to the pandemic – the cognitive supply chain market has demonstrated consistent year-over-year growth (World Trade Organization, 2024). Most significantly, the cognitive supply chain market shows a steeper growth trajectory than general trade volumes, increasing from approximately $5.7 billion in

2019 to $8.6 billion in 2024. This accelerated growth rate suggests increasing integration of AI technologies in global commerce operations and highlights the expanding role of intelligent systems in managing international supply chains.

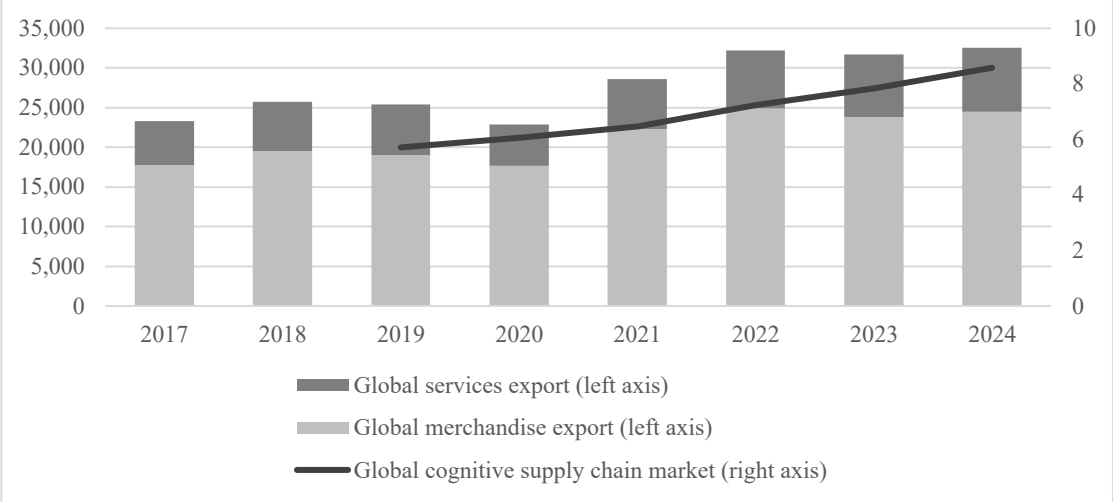

Figure 1. Global exports and cognitive supply chain market (billions of US dollars)
Source: own elaboration based on (Global Cognitive Supply Chain Market Size & Outlook, 2024; *WTO Stats*, 2025).

Future projections for the cognitive supply chain market are highly optimistic. Although specific forecasts differ, market analysis consistently predicts substantial growth. Precedence Research anticipates a 2.6-fold increase between 2024 and 2030, while both KBV Research and Polaris Research project a market size more than doubling within the same period (Artificial Intelligence Market Size, Share, Trends, Industry Analysis Report, 2024; *Cognitive Supply Chain Market Size, Share and Trends 2024 to 2034*, 2025; Global Cognitive Supply Chain Market Size & Outlook, 2024). This strong growth is expected to be driven by the increasing adoption of AI and machine learning, the escalating complexity of global supply chains, and the growing imperative for efficiency and resilience in international trade (Harnessing the Value of Generative AI: Top Use Cases across Sectors, 2024). The integration of cognitive capabilities is becoming essential for organizations aiming to effectively operate in the global marketplace and maintain a competitive advantage.

4.2. AI Implementation in Intelligent Supply Chain Management

While the cognitive supply chain represents a key area of AI application, generative AI is also gaining traction across a multitude of industries and functions. Table 1 illustrates the global adoption of generative AI across industries in 2024, highlighting the diverse applications of this technology. Technology companies demonstrate the highest overall AI adoption at 88%, followed by professional services (80%), advanced industries (79%), and media/telecom (79%). The consumer goods and retail sector shows 68% adoption, while financial services and healthcare register 65% and 63% respectively.

When examining supply chain and inventory management functions specifically, adoption rates are notably lower than in other business areas such as marketing and sales. Advanced industries lead in supply chain AI implementation at 15%, followed closely by consumer goods and retail at 14%. Other sectors show significantly lower adoption rates in supply chain functions: technology (10%), energy and materials (6%), financial services (4%), professional services (4%), media and telecom (3%), and healthcare (2%). This data suggests that despite the potential benefits, actual implementation of AI in supply chain functions lags behind other business areas, indicating substantial room for growth in supply chain AI implementation across industries.

To illustrate the impact of generative AI, the following charts focus on the financial benefits experienced by organizations. Figure 2 shows the percentage of respondents reporting a decrease in costs in their business units due to the generative use of artificial intelligence, while Figure 3 shows an increase in revenue in business units due to gen AI, both charts are for 2024, and segmented by function.

Table 1. Global adoption of generative AI across industries in 2024, by function

Global adoption of generative AI across industries in 2024, by function (%)	Marketing and sales	Service operations	Strategy and corporate finance	Supply chain/inventory management	Manufacturing	Using gen AI in at least 1 function
Technology	55	30	14	10	5	88
Professional services	49	23	14	4	3	80
Advanced industries	48	24	21	15	13	79
Media and telecom	45	37	10	3	3	79
Consumer goods and retail	46	13	7	14	8	68
Financial services	40	26	7	4	0	65
Healthcare, pharma, and medical products	20	14	6	2	5	63
Energy and materials	33	13	5	6	7	59

Source: own elaboration based on (*Statista. Global adoption of generative artificial intelligence (AI)*, 2025).

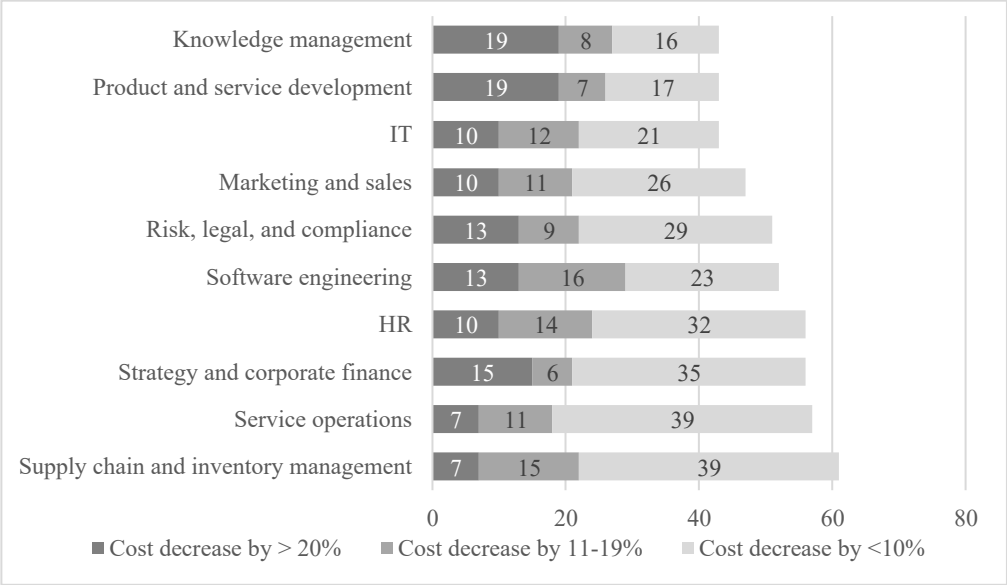

Figure 2. Cost decrease within business units from gen AI use in 2024, by function, % of respondents
Source: based on (Singla et al., 2025).

Supply chain and inventory management functions reported the highest percentage of cost decreases among all surveyed business units, with 61% of respondents confirming this, according to Figure 2. This finding suggests that supply chain applications of AI deliver particularly significant efficiency improvements compared to other functional implementations. Figure 3 complements this data by illustrating revenue increases attributed to AI implementation across business functions, showing how AI technologies contribute to both cost reduction and revenue enhancement in supply chain operations.

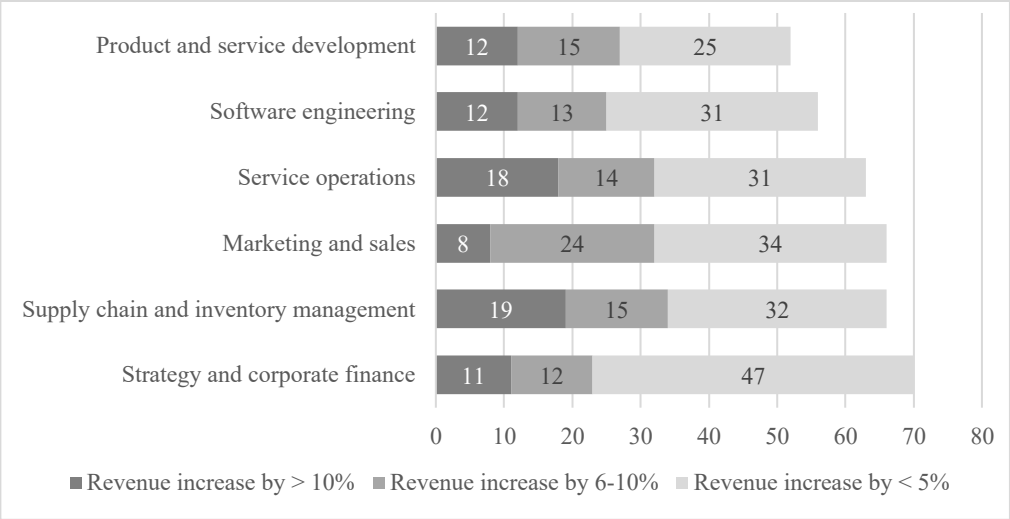

Figure 3. Revenue increase within business units from gen AI use in 2024, by function, % of respondents
Source: based on (Singla et al., 2025).

4.3. Comparative Analysis of ISCM With and Without AI

To understand the specific ways AI is reshaping international trade, Table 2 presents a systematic, process-by-process comparison of intelligent supply chain management with and without AI across seven crucial areas. The comparative data reveals significant transformations in both the capabilities and the outcomes of these operations.

In Data Analysis and Forecasting, the implementation of AI enables a transition from limited historical data analysis to comprehensive predictive analytics that incorporate diverse data sources including market indicators, geopolitical factors, and currency fluctuations. This enhancement delivers significantly higher forecasting accuracy and improved risk management capabilities for international operations.

Process Automation capabilities show a dramatic evolution from basic task automation to sophisticated handling of complex international documentation and customs procedures. The introduction of robotics in international logistics operations yields substantial benefits including cost reductions, process acceleration, and minimized errors across cross-border operations.

Logistics and Transportation Optimization demonstrates perhaps the most visible transformation, evolving from static route planning based on fixed data to dynamic, real-time optimization that considers multiple variables including traffic conditions, weather patterns, and customs regulations. This advancement enables tangible benefits including reduced transportation costs, shortened delivery times, and enhanced flexibility in international shipping operations.

Similar transformational patterns appear across the remaining process areas. Supplier Relationship Management advances from limited collaboration capabilities to AI-powered platforms that enable automatic risk assessment and dynamic contract adjustments. Visibility and Transparency improves from restricted shipment tracking to comprehensive real-time visibility across the entire supply chain. Risk Management evolves from reactive approaches to proactive risk prediction and automated contingency planning. Sustainable Development progresses from limited environmental monitoring to sophisticated capabilities including route optimization for emissions reduction and comprehensive carbon footprint tracking.

Table 2. AI's influence on ISCM components in global trade

ISCM element	Without AI in international trade	With AI in international trade	AI impact
Data Analysis and Forecasting	Historical data analysis, statistical models, limited consideration of foreign market variability	Predictive data analysis from various sources (markets, geopolitics, currencies), machine learning for demand and trend forecasting	Significantly higher forecasting accuracy, better understanding of foreign markets, risk minimization
Process Automation	Automation of simple tasks, difficulties in automating complex customs and trade procedures	Automation of complex processes (trade documentation, customs procedures), robotics in international logistics	Cost reduction, process acceleration, error minimization, increased efficiency
Logistics and Transportation Optimization	Route planning based on fixed data, GPS systems, difficulties in optimizing complex international logistics	Real-time optimization, consideration of multiple variables (traffic, weather, customs regulations), autonomous vehicles	Transportation cost reduction, delivery time reduction, increased flexibility, delay minimization
Supplier Relationship Management (SRM)	Limited supplier collaboration, difficulties in assessing risk in a global supply chain	AI-powered collaboration platforms, automatic supplier risk assessment, dynamic contract adjustments	Better collaboration, risk minimization, cost optimization, greater flexibility
Visibility and Transparency	Limited shipment tracking, lack of full visibility of goods flow across borders	Real-time tracking, blockchain-based platforms, full supply chain visibility	Increased trust, fraud risk minimization, faster problem response
Risk Management	Reactive actions, difficulties in predicting political and economic risks in foreign markets	Proactive risk prediction (regulatory changes, sanctions, conflicts), automatic contingency plans	Loss minimization, increased resilience to disruptions, faster response to changes
Sustainable Development	Limited actions, difficulties in monitoring the environmental impact of international transport	Route optimization, emission reduction, carbon footprint monitoring, sustainable sourcing	Reduced negative environmental impact, improved company image, financial savings

Source: own elaboration.

This comparative analysis identifies that the most significantly transformed processes appear to be Data Analysis and Forecasting, Risk Management, and Logistics Optimization, where AI capabilities enable fundamental shifts in operational approach rather than merely incremental improvements. To illustrate these transformative effects in real-world scenarios, the following case studies examine how industry leaders Amazon and Maersk have implemented artificial intelligence across their supply chain management. These examples demonstrate how AI technologies transform traditional processes and deliver measurable business value, offering valuable insights for other companies seeking successful AI integration in global supply chains.

4.4. Case Studies: Maersk and Amazon

Case study 1: Maersk

Maersk is the world's largest container shipping company, operating in 130 countries with a fleet of over 700 vessels that transport approximately 17% of global containerized trade. The company's supply chain operations involve complex coordination of shipping schedules, port operations, customs processing, and intermodal transportation networks. Maersk has increasingly positioned itself as a

technological innovator in the traditionally conservative shipping industry (*Maersk*, 2025; Maerska Annual Report 2024, 2025).

Maersk has developed sophisticated digital twin technology for its terminal operations, creating complete digital replicas that integrate data from multiple sensors and operational systems. This implementation enables terminal operators to visualize complex operational states and simulate different scenarios before making decisions. The technology has transformed port operations planning from intuition-based approaches with limited analytical support to data-driven optimization with comprehensive scenario testing capabilities. The implementation delivers significant operational advantages. Planning processes that previously required days of manual calculations using spreadsheets now complete in hours, representing a 10x acceleration for complex scenarios. Operational efficiency has significantly improved terminal operations, with vessel turnaround times reduced at major ports. These improvements translate directly to enhanced asset utilization and service reliability. From a practical implementation perspective, Maersk began with digital models of smaller terminals before scaling to larger operations, allowing for progressive capability development and organizational learning.

Maersk's deployment of AI has significantly reshaped its global supply chain operations by improving real-time visibility, accelerating decision-making, and supporting strategic risk management. A prominent example is the StarConnect platform, which processes approximately 2.5 billion data points annually and applies machine learning to optimize vessel routes and forecast fuel consumption. By using a wealth of data from shipping lanes, port conditions, and historical cargo flows, StarConnect identifies more efficient passage options, enabling Maersk to reduce transit times and fuel usage while still meeting tight schedules. These continuous, data-driven adjustments make it easier to respond promptly to unforeseen challenges such as shifting customer demands or port slowdowns, and they also ease congestion across Maersk's broader logistics network.

The company also invests in generative AI, notably through a solution called "CX Agent Assist", which draws upon advanced models to process customer inquiries and streamline issue resolution. This generative AI tool reduces response times by presenting service teams with suggested solutions, thereby freeing agents to address more complex tasks that require negotiation or judgment. As part of its broader roadmap, Maersk has integrated these AI initiatives into "agentic workflows", a company-wide approach to automation designed to ensure that data and machine intelligence can flow across multiple operational layers, from ocean freight bookings to warehouse management.

At the same time, the adoption of AI has prompted Maersk to develop governance measures for compliance and data ethics. Through initiatives such as automated data-access controls and a universal data ethics policy, the company seeks to protect sensitive customer information while maintaining regulatory readiness in a global environment of evolving AI legislation. This balance between innovation and risk management is considered vital, not only for sustaining customer trust but also for preserving Maersk's reputation as a leader in responsible technology use.

Although Maersk has yet to announce specific numeric gains directly attributed to the company-wide integration of AI, the 2024 Annual Report notes an overall improvement in service reliability and cost control. Operational benefits from AI-assisted route optimization have helped preserve fuel and meet tighter shipping timetables, while generative AI initiatives speed up customer support, contributing to better on-time performance. Taken together, these innovations strengthen Maersk's end-to-end logistics services by reducing response times, bolstering supply chain resilience, and paving the way for continued, data-driven efficiencies throughout its network.

Case study 2: Amazon

Amazon operates one of the world's largest and most complex supply chain networks, spanning across 185 fulfillment centers globally and processing billions of packages annually (Amazon Annual Report, 2024). The company has consistently invested in technological innovation to enhance operational efficiency and customer experience. Amazon's supply chain must manage extraordinary complexity, including over 12 million SKUs product, seasonal demand fluctuations, and customer expectations for rapid delivery. Amazon has implemented AI extensively throughout its supply chain operations, transforming traditional e-commerce processes to achieve unprecedented scale, efficiency, and customer experience (*Amazon*, 2025; Amazon.com Annual Report 2024, 2025).

Amazon's extensive e-commerce ecosystem depends on precise demand forecasting, rapid fulfillment, and efficient last-mile delivery. AI-driven systems enable each of these elements to function cohesively, thereby transforming the supply chain into a scalable and adaptive network that consistently meets high customer expectations. Machine learning models absorb and analyze large volumes of real-time order data, product availability, and customer behavior to forecast shifts in demand for millions of SKUs. As a result, Amazon can allocate inventory more strategically and reduce lead times by anticipating regional sales fluctuations before they escalate into bottlenecks.

One of the most visible applications of AI is in warehouse automation, where computer vision and predictive analytics guide robots in sorting packages and restocking shelves. This contributes to lower error rates and a faster pace of operations, minimizing the intervals between picking an item and getting it ready for shipment. The vast network of fulfillment centers is connected by internal algorithms that recommend how many units of a given product should be stored in each warehouse, allowing Amazon to stage inventory closer to end consumers and slash transportation costs.

At the same time, Amazon uses AI-assisted route planning to streamline the delivery of orders. These machine learning models integrate factors such as traffic conditions, driver availability, and parcel density to suggest optimal delivery pathways. By synchronizing all these inputs, Amazon mitigates delays, controls fuel consumption, and reduces carbon emissions. The practical impact of improved routing can be seen in Amazon's shift toward building out its own trucking fleets and last-mile service, where AI plays a substantial role in analyzing local traffic patterns and adapting delivery zones in near real time.

Incorporating machine learning also strengthens collaboration with the third-party sellers who rely on Amazon for both customer exposure and logistical support. Tools like Fulfillment by Amazon (FBA) leverage AI to estimate the best shipping rates, fulfillment routes, and packaging processes to ensure that a growing segment of Amazon's e-commerce marketplace runs efficiently. Amazon's broader engagement with advanced AI (including its investment in Anthropic) suggests it is positioning itself to adopt next-generation AI solutions as they mature.

By combining internal robotics, data analytics, and cloud-based machine learning services, Amazon is continuously refining inventory distribution and speeding up deliveries across hundreds of fulfillment facilities worldwide. The result is a logistics pipeline that harnesses AI insights for proactive decision-making, whether predicting seasonal spikes in product categories or mapping the most efficient dispatch route for a driver.

The Maersk and Amazon case studies reveal several valuable implementations patterns that other organizations can adapt:

First, both organizations demonstrate the value of phased implementation approaches that begin with targeted applications before expanding to more comprehensive integration. This approach enables organizational learning and capability development while delivering incremental benefits, providing a practical model for managing implementation complexity.

Second, both organizations integrate AI with existing operations rather than pursuing wholesale replacement, allowing for evolutionary transformation rather than disruptive change. This approach minimizes operational risk while accelerating adoption, particularly important in complex global supply chains management where continuity is essential.

Third, both organizations maintain human-AI collaboration, leveraging complementary capabilities rather than pursuing full automation. This approach enhances adoption while maintaining human judgment for complex decisions, offering a practical model for balancing automation with expertise.

Fourth, both organizations demonstrate the importance of data foundation development before advanced algorithm implementation. This sequencing ensures that AI systems have the necessary inputs for effective operation, highlighting the critical role of data infrastructure in successful AI implementation.

These case studies illustrate how AI can transform global supply chain management by enhancing efficiency, improving decision quality, and enabling new capabilities. The implementations at Maersk and Amazon provide practical models that other organizations can adapt to their specific situations, demonstrating pathways to successful AI integration in international trade operations.

5. DISCUSSION

The implementation of AI technologies in international supply chain management represents a significant shift in how global trade operations are conducted, with far-reaching implications for competitive dynamics, organizational structures, and development.

5.1. Competitive Implications for Global Trade Participants

The integration of AI into supply chain processes is fundamentally altering the basis of competition in international markets. Organizations that effectively implement AI capabilities gain substantial advantages in operational efficiency, decision quality, and market responsiveness (Ferencz et al., 2022). These capabilities create new competitive differentiators beyond traditional factors such as scale, cost structure, or geographical presence. For example, Maersk's implementation of AI-driven vessel optimization and Amazon's predictive inventory positioning demonstrate how enhanced forecasting capabilities and dynamic operational adjustments enable superior service levels even in volatile market conditions.

AI implementation also enables new market access and expansion opportunities by reducing the complexity barriers of international trade. Smaller organizations can potentially leverage AI platforms to navigate regulatory requirements, optimize cross-border logistics, and manage international supplier relationships that would previously have been prohibitively complex without substantial specialized expertise. This democratization of international trade capabilities may allow more diverse market participation, though the resource requirements for advanced AI implementation may simultaneously create new barriers to entry.

The relationships between supply chain partners are evolving as AI systems increasingly mediate interactions and decision processes. Traditional arm's-length transactional relationships are giving way to more integrated data-sharing arrangements that enable collaborative optimization across organizational boundaries. As demonstrated in both case studies, the effectiveness of AI implementations often depends on the quality and scope of data shared between partners, creating incentives for deeper integration while raising questions about dependency and power dynamics within supply networks.

5.2. Implementation Challenges and Success Factors

The technical integration of AI systems presents substantial challenges in international environment. Organizations must navigate heterogeneous technology environments, varying data standards, and diverse regulatory frameworks across multiple jurisdictions. The cross-border nature of international trade amplifies these challenges, requiring systems capable of operating across different technological infrastructures and adapting to local requirements. Both Amazon and Maersk demonstrate the necessity of developing scalable, adaptable technical architectures that can accommodate this complexity.

Organizational change management emerges as a critical success factor in AI implementation. The transformation of decision processes from human judgment to algorithmic analysis requires significant cultural adaptation, revision of established workflows, and reconfiguration of authority structures. The case studies indicate that successful implementations typically involve progressive capability development rather than abrupt transitions, allowing organizational learning and adaptation to occur incrementally.

Data quality and availability issues present persistent challenges, particularly in international flows where information may originate from diverse sources with varying standards, formats, and reliability. The ability to establish data governance frameworks that ensure consistency, accuracy, and timeliness across organizational and national boundaries appears to be a key differentiator in implementation success. This challenge is especially pronounced in areas with limited digital infrastructure or where paper-based processes remain prevalent.

The development of necessary skills and capabilities represents another significant implementation challenge. Organizations must cultivate specialized expertise in AI technologies, data science, and international trade operations. Both case organizations addressed this challenge through substantial investments in training programs, strategic hiring, and partnerships with technology specialists, approaches that may not be equally accessible to smaller market participants.

5.3. Ethical and Organizational Considerations

The implementation of AI in supply chain management processes raises important questions about decision authority and accountability. As algorithmic systems increasingly make or recommend decisions previously made by humans, organizations must establish clear frameworks for oversight, intervention, and responsibility. This challenge is amplified in international trade where different cultural and legal traditions may have varying expectations regarding autonomy, transparency, and liability in automated decision-making.

Privacy and security concerns in cross-border data flows present both operational and compliance challenges. International supply chains management inherently involve the movement of sensitive information across jurisdictional boundaries with different regulatory requirements and security standards. Organizations must navigate this complex landscape while maintaining sufficient data sharing to enable effective AI operation. Maersk's development of automated data-access controls and universal data ethics policies exemplifies the type of governance frameworks required to address these concerns.

The implications for workforce roles and skills are substantial and multifaceted. While routine decision-making and administrative processes may be increasingly automated, the case studies suggest that human roles are evolving rather than simply disappearing. New positions emerge in areas such as algorithm oversight, exception handling, relationship management, and system development. However, this transition creates significant workforce development challenges and potential displacement effects that organizations and policymakers must address.

5.4. Future Development Trajectory

Emerging new technologies including blockchain, digital twins, and advanced analytics present opportunities for further enhancement of AI capabilities in international supply chains. The potential integration of these technologies could address current limitations in data visibility, trust, and simulation capabilities. Both case organizations demonstrate active exploration of these complementary technologies, suggesting a trajectory toward increasingly sophisticated, integrated intelligent systems rather than standalone AI applications.

The regulatory environment for AI in international trade continues to evolve rapidly, with implications for implementation approaches and governance requirements. Different jurisdictions are developing varying frameworks regarding algorithmic transparency, data localization, and automated decision-making. Organizations operating global supply chains must navigate this complex and shifting landscape, potentially adapting their implementation approaches to accommodate divergent requirements across markets.

Diffusion patterns across industries appear uneven, as indicated by the adoption data presented in the results. While technology-intensive sectors demonstrate relatively high adoption rates, traditional industries show more variable implementation. This uneven diffusion may create temporary competitive advantages for early adopters while potentially exacerbating existing disparities in international trade participation.

6. CONCLUSION

This research has identified several significant areas where AI technologies are transforming international supply chain management processes. The most profound transformations appear in data analysis and forecasting, where predictive capabilities enable unprecedented accuracy in demand planning and risk assessment; logistics optimization, where real-time adjustments and multi-factor optimization create substantial efficiency gains; and risk management, where proactive identification and automated contingency planning enhance resilience in volatile global markets.

While precise quantification of improvements remains challenging due to limited disclosure of operational metrics, the case studies provide evidence of substantial enhancements in specific operational processes. Examples include Maersk's acceleration of terminal planning processes and improved vessel turnaround times, and Amazon's enhanced inventory positioning and reduced lead times through AI-driven demand forecasting. The McKinsey survey data further substantiates these

improvements, with 61% of respondents reporting cost decreases in supply chain and inventory management functions through AI implementation.

For international trade participants, these transformations create strategic advantages including enhanced ability to navigate regulatory complexity, improved adaptation to market volatility, and increased operational efficiency across borders. Organizations that effectively implement AI capabilities can achieve both cost advantages through operational optimization and revenue enhancement through improved service levels and responsiveness to market changes.

6.1. Theoretical Contributions

This research advances ISCM conceptual frameworks by systematically mapping the transformational impact of AI technologies across specific supply chain processes in international contexts. The comparative analysis framework developed for this study provides a structured approach for evaluating technological enhancement of supply chain capabilities, extending beyond general discussions of digital transformation to identify specific process-level changes and their operational implications.

The process-level examination of AI transformation mechanisms contributes to a more nuanced understanding of how intelligent technologies alter decision-making, information flows, and operational capabilities in organizational contexts. Rather than treating AI as a monolithic technology, this approach illuminates how different applications create distinct patterns of enhancement across various supply chain functions.

By specifically focusing on international trade areas, this research integrates cross-border considerations into digital transformation theory. The findings highlight how factors such as regulatory diversity, geographical distance, and cultural variation influence both implementation approaches and realized benefits. This integrative approach addresses a gap in existing literature that often examines digital transformation primarily within domestic operational boundaries.

6.2. Practical Implications

For organizations considering AI implementation in intelligent supply chains management, this research suggests an implementation roadmap that begins with process areas demonstrating the most substantial transformation potential: predictive analytics for demand forecasting, logistics optimization, and risk management. Initial implementations appear most successful when they focus on clear operational pain points with measurable outcomes, allowing for demonstrated value while building organizational capabilities.

The findings support a prioritization framework for AI investments based on both transformation potential and implementation complexity. Data analysis and forecasting applications typically offer strong initial returns with relatively straightforward implementation, while more complex applications such as autonomous logistics or automated customs management may require more extensive preparatory work in data infrastructure and process standardization.

Effective management approaches for maximizing value realization include progressive capability development rather than abrupt transitions, intentional cultivation of complementary human skills alongside AI capabilities, and development of governance frameworks addressing accountability and oversight. The case studies demonstrate that successful implementations typically involve sustained, strategic investments rather than isolated technology deployments.

6.3. Future Research Directions

This study highlights several promising directions for future research. Quantitative studies on long-term competitive impacts would address the current limitation of limited performance data, potentially examining how AI implementation influences market share, profitability, and strategic positioning over extended periods. Such studies would require development of standardized metrics that could enable meaningful cross-organizational comparison.

Industry-specific and regional variation analysis would enhance understanding of how these factors influence AI implementation approaches and outcomes. Different industries face distinct supply chain challenges and operate with varying levels of digital maturity, suggesting potential for targeted studies examining how these factors shape AI adoption and effectiveness in international activity.

Integration with other emerging technologies presents another promising research direction. The potential synergies between AI, blockchain, digital twins, and IoT technologies in international supply

chains merit further investigation, particularly regarding how these integrated systems might address current limitations in visibility, trust, and predictive accuracy.

6.4. Concluding Assessment of AI's Transformative Impact

A balanced assessment of AI's impact on international supply chains management must acknowledge both the significant capabilities demonstrated in leading implementations and the substantial challenges that remain. Current AI systems excel at pattern recognition, optimization within defined parameters, and processing of structured information, enabling substantial enhancements in forecasting, logistics, and risk management. However, limitations persist in handling highly uncertain environments, adapting to novel situations without historical precedent, and operating effectively with incomplete information—all common characteristics of international trade.

The long-term outlook for international trade operations suggests continued advancement toward more adaptive, integrated intelligent systems that combine AI capabilities with complementary technologies and human expertise. Rather than complete automation, the emerging paradigm appears to be collaborative intelligence that enhances human capabilities while preserving critical judgment in complex decision contexts.

Policy and ecosystem considerations will significantly influence this developmental trajectory. The evolution of regulatory frameworks for AI governance, development of standards for algorithmic transparency and data sharing, and investment in workforce adaptation will shape how these technologies diffuse. Policymakers, industry leaders, and educational institutions all have important roles to play in creating an ecosystem that enables responsible, inclusive advancement of intelligent supply chain capabilities in global commerce.

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REFERENCES`

Amazon. (2025). https://ir.aboutamazon.com/

Amazon.com Annual Report 2024. (2025). Retrieved from: https://stocklight.com/stocks/us/nasdaq-amzn/amazon-com/annual-reports/nasdaq-amzn-2024-10K-24588330.pdf (14.01.2025).

Artificial Intelligence Market Size, Share, Trends, Industry Analysis Report. (2024). Polaris Market Research. Retrieved from: https://www.polarismarketresearch.com/industry-analysis/artificial-intelligence-market (14.01.2025).

Baryannis, G., Validi, S., Dani, S., & Antoniou, G. (2019). Supply chain risk management and artificial intelligence: State of the art and future research directions. *International Journal of Production Research*, *57*(7), 2179–2202. https://doi.org/10.1080/00207543.2018.1530476.

Belu, M. G. (2025). Artificial intelligence in international trade: A bibliometric analysis. *The Romanian Economic Journal*, *89*. https://doi.org/10.24818/REJ/2024/89/01.

Brau, R. I., Sanders, N. R., Aloysius, J., & Williams, D. (2024). Utilizing people, analytics, and AI for decision making in the digitalized retail supply chain. *Journal of Business Logistics*, *45*(1), e12355. https://doi.org/10.1111/jbl.12355.

Budhwar, P., Chowdhury, S., Wood, G., Aguinis, H., Bamber, G. J., Beltran, J. R., Boselie, P., Lee Cooke, F., Decker, S., DeNisi, A., Dey, P. K., Guest, D., Knoblich, A. J., Malik, A., Paauwe, J., Papagiannidis, S., Patel, C., Pereira, V., Ren, S., Varma, A. (2023). Human resource management in the age of generative artificial intelligence: Perspectives and research directions on ChatGPT. *Human Resource Management Journal*, *33*(3), 606–659. https://doi.org/10.1111/1748-8583.12524.

Camargo, L. R., Pereira, S. C. F., & Scarpin, M. R. S. (2020). Fast and ultra-fast fashion supply chain management: An exploratory research. *International Journal of Retail & Distribution Management*, *48*(6), 537–553. https://doi.org/10.1108/IJRDM-04-2019-0133.

Cannas, V. G., Ciano, M. P., Saltalamacchia, M., & Secchi, R. (2024). Artificial intelligence in supply chain and operations management: A multiple case study research. *International Journal of Production Research*, *62*(9), 3333–3360. https://doi.org/10.1080/00207543.2023.2232050.

Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution & Logistics Management*, *38*(5), 360–387. https://doi.org/10.1108/09600030810882816.

Cognitive Supply Chain Market Size, Share and Trends 2024 to 2034. (2025). Precedence Research. Retrieved from: https://www.precedenceresearch.com/cognitive-supply-chain-market (14.01.2025).

Dey, P. K., Chowdhury, S., Abadie, A., Vann Yaroson, E., & Sarkar, S. (2024). Artificial intelligence-driven supply chain resilience in Vietnamese manufacturing small- and medium-sized enterprises. *International Journal of Production Research*, *62*(15), 5417–5456. https://doi.org/10.1080/00207543.2023.2179859.

Dubey, R., Gunasekaran, A., Childe, S. J., Bryde, D. J., Giannakis, M., Foropon, C., Roubaud, D., & Hazen, B. T. (2020). Big data analytics and artificial intelligence pathway to operational performance under the effects of entrepreneurial orientation and environmental dynamism: A study of manufacturing organisations. *International Journal of Production Economics*, *226*, 107599. https://doi.org/10.1016/j.ijpe.2019.107599.

Dwivedi, Y. K., Pandey, N., Currie, W., & Micu, A. (2024). Leveraging ChatGPT and other generative artificial intelligence (AI)-based applications in the hospitality and tourism industry: Practices, challenges and research agenda. *International Journal of Contemporary Hospitality Management*, *36*(1), 1–12. https://doi.org/10.1108/IJCHM-05-2023-0686.

Ferencz, J., López-González, J., & García, I. O. (2022). Artificial intelligence and international trade. Some preliminary implications. *OECD Trade Policy Paper*, *160*.

Global cognitive supply chain market size & outlook. (2024). Grand View Research. Retrieved from: https://www.grandviewresearch.com/horizon/outlook/cognitive-supply-chain-market-size/global (02.03.2025).

Harnessing the value of generative AI: Top use cases across sectors. (2024). Capgemini Research Institute. Retrieved from: https://www.capgemini.com/wp-content/uploads/2024/11/Generative-AI-in-Organizations -Refresh_25112024.pdf (03.03.2025).

Hartmann, J., & Moeller, S. (2014). Chain liability in multitier supply chains? Responsibility attributions for unsustainable supplier behavior. *Journal of Operations Management*, *32*(5), 281–294. https://doi.org/10.1016/j.jom.2014.01.005.

Hendriksen, C. (2023). Artificial intelligence for supply chain management: Disruptive innovation or innovative disruption? *Journal of Supply Chain Management*, *59*(3), 65–76. https://doi.org/10.1111/jscm.12304.

Ivanov, D., & Dolgui, A. (2020). Viability of intertwined supply networks: Extending the supply chain resilience angles towards survivability. A position paper motivated by COVID-19 outbreak. *International Journal of Production Research*, *58*(10), 2904–2915. https://doi.org/10.1080/00207543.2020.1750727.

Kshetri, N. (2023). Metaverse technologies in product management, branding and communications: Virtual and augmented reality, artificial intelligence, non-fungible tokens and brain-computer interface. *Central European Management Journal*, *31*(4), 511–521. https://doi.org/10.1108/CEMJ-08-2023-0336.

Maersk. (2025). Retrieved from: https://www.maersk.com (01.03.2025).

Maersk Annual Report 2024. (2025). Retrieved from: https://investor.maersk.com/static-files/31bf05a1-6f0c-4fbd-a3c7-3f58e044f668 (01.03.2025).

Merlino, M., & Sproġe, I. (2017). The augmented supply chain. *Procedia Engineering*, *178*, 308–318. https://doi.org/10.1016/j.proeng.2017.01.053.

Mohsen, B. M. (2023). Impact of artificial intelligence on supply chain management performance. *Journal of Service Science and Management*, *16*(01), 44–58. https://doi.org/10.4236/jssm.2023.161004.

Muthuswamy, M., & M. Ali, A. (2023). Sustainable supply chain management in the age of machine intelligence: Addressing challenges, capitalizing on opportunities, and shaping the future landscape. *Sustainable Machine Intelligence Journal*, *3*. https://doi.org/10.61185/SMIJ.2023.33103.

Nayak, R., & Choudhary, S. (2022). Operational excellence in humanitarian logistics and supply chain management through leagile framework: A case study from a non-mature economy. *Production Planning & Control*, *33*(6–7), 606–621. https://doi.org/10.1080/09537287.2020.1834135.

Ozturk, O. (2024). The impact of AI on international trade: Opportunities and challenges. *Economies*, *12*(11), 298. https://doi.org/10.3390/economies12110298.

Pan, S. L., & Nishant, R. (2023). Artificial intelligence for digital sustainability: An insight into domain-specific research and future directions. *International Journal of Information Management*, *72*, 102668. https://doi.org/10.1016/j.ijinfomgt.2023.102668.

Pournader, M., Ghaderi, H., Hassanzadegan, A., & Fahimnia, B. (2021). Artificial intelligence applications in supply chain management. *International Journal of Production Economics*, *241*, 108250. https://doi.org/10.1016/j.ijpe.2021.108250.

Qu, C., & Kim, E. (2024). Reviewing the roles of AI-integrated technologies in sustainable supply chain management: Research propositions and a framework for future directions. *Sustainability*, *16*(14), 6186. https://doi.org/10.3390/su16146186.

Radhakrishnan, G. V. (2025). AI and IoT in supply chains: Creating intelligent and autonomous business operations. *Journal of Information Systems Engineering and Management*, *10*(11s), 625–632. https://doi.org/10.52783/jisem.v10i11s.1664.

Richey, R. G., Chowdhury, S., Davis-Sramek, B., Giannakis, M., & Dwivedi, Y. K. (2023). Artificial intelligence in logistics and supply chain management: A primer and roadmap for research. *Journal of Business Logistics*, *44*(4), 532–549. https://doi.org/10.1111/jbl.12364.

Richey, R. G., & Davis-Sramek, B. (2022). What about policy research? *Journal of Business Logistics*, *43*(4), 416–420. https://doi.org/10.1111/jbl.12324.

Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, *16*(15), 1699–1710. https://doi.org/10.1016/j.jclepro.2008.04.020.

Singla, A., Sukharevsky, A., Yee, L., Chui, M., & Hall, B. (2025). *The state of AI: How organizations are rewiring the caoture value. Survey*. McKinsey. Retrieved from: https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai (03.03.2025).

Statista. Global adoption of generative artificial intelligence (AI). (2025). Statista. Retrieved from: https://www.statista.com/statistics/1607179/genai-adoption-across-industries-and-functions/ (04.03.2025).

Toorajipour, R., Sohrabpour, V., Nazarpour, A., Oghazi, P., & Fischl, M. (2021). Artificial intelligence in supply chain management: A systematic literature review. *Journal of Business Research*, *122*, 502–517. https://doi.org/10.1016/j.jbusres.2020.09.009.

Treiblmaier, H., & Garaus, M. (2023). Using blockchain to signal quality in the food supply chain: The impact on consumer purchase intentions and the moderating effect of brand familiarity. *International Journal of Information Management*, *68*, 102514. https://doi.org/10.1016/j.ijinfomgt.2022.102514.

Wamba, S. F., & Queiroz, M. M. (2020). Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities. *International Journal of Information Management*, *52*, 102064. https://doi.org/10.1016/j.ijinfomgt.2019.102064.

World Trade Organization (Red.). (2024). *Trading with intelligence: How AI shapes and is shaped by international trade*. World Trade Organization.

WTO Stats. (2025). [Dataset]. Retrieved from: https://stats.wto.org/ (03.03.2025).

Zhang, J., Li, X., & Wang, L. (2024). A review selection method based on consumer decision phases in e-commerce. *ACM Transactions on Information Systems*, *42*(1), 1–27. https://doi.org/10.1145/3587265.