

ARTIFICIAL INTELLIGENCE AS A STRATEGIC LEVER FOR ENHANCING PERFORMANCE IN SERVICE SECTOR SUPPLY CHAINS: A SYSTEMATIC LITERATURE REVIEW

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Abstract. *Purpose* – this study was undertaken through a systematic literature review to identify the central role of Artificial Intelligence (AI) in improving supply chain performance across all service sectors.

Research methodology – a dual methodological approach was used involving both quantitative and qualitative analysis. The former is largely based on a bibliometric analysis of 61 peer-reviewed articles published between 2019 and 2024. In this respect, two software tools, RStudio and VOSviewer, were used to provide a comprehensive bibliometric landscape. The second concerns a thematic content analysis of 25 full-text studies, focusing on AI techniques, performance results and industry-specific implementation challenges.

Findings – the overall result of this systematic review indicates that AI contributes to service supply chain performance by improving forecasting, resilience, operational efficiency and real-time decision-making.

Research limitations – however, limitations such as data availability, system interoperability, ethical risks and organizational resistance remain important.

Practical implications – the results of this study help practitioners to select AI solutions suitable for their sector and to anticipate obstacles to integration.

Originality/Value – this study provides a better understanding of how AI is reshaping supply chains in service industries, while identifying key avenues for both future research and practical adoption.

Keywords: artificial intelligence, bibliometric analysis, performance, service supply chains, systematic literature review.

JEL Classification: L80, M11, M15, O33.

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1. Introduction

As a result of the COVID-19 pandemic, the demand for effective and resilient supply chains has grown substantially in many sectors, such as the service industry. As a matter of fact, promoting a strong and well-established supply chain has been considered inevitable in the service economy (Belhadi et al., 2024; Ivanov, 2021; Modgil et al., 2022a, 2022b). Although the industrial sector has witnessed drastic changes, especially with the integration of Artificial

Intelligence (AI), the latter adoption in sector service remains, to a considerable degree, dispersed and insufficiently studied in literature (Durach & Gutierrez, 2024; Frederico, 2023). Differently put, service supply chains often operate in highly dynamic environments characterized by instable data flows and a dire need for immediate human-centered decision support (Jackson et al., 2024; Purnama et al., 2023; Virmani et al., 2024).

As artificial intelligence has gained adequate academic attention in different domains, numerous studies have examined the extent to which AI can improve these supply chains by ameliorating forecasting accuracy, heightening distribution processes, and assisting data-driven, personalized services (Azadi et al., 2023; Ortiz-Barrios et al., 2023; Ronchini et al., 2024). AI tools such as machine learning, deep learning, federated learning, and generative models are employed to address performance bottlenecks and operational complexity (Benzidia et al., 2021; Kong et al., 2024; Zheng et al., 2023). As a case in point, researchers in the healthcare domain in relation to AI argue that AI-powered tools have enabled smarter intensive care unit capacity management and sustainable resource allocation (Azadi et al., 2023; Ortiz-Barrios et al., 2023). Likewise, other researchers in finance and logistics posit that AI has supported fraud prevention, instant inventory forecasting, and routing strategies (Jauhar et al., 2024; Loske & Klumpp, 2021; Ronchini et al., 2024).

It is noteworthy to bring to the limelight that AI tools are not only utilized for operational efficiency but also for ameliorating resilience and responsiveness to disruption. Literature proves that AI-powered tools speed up the process of adjusting supply networks, preliminary risk assessment, and agile decision-making under uncertain conditions (Belhadi et al., 2024; Modgil et al., 2022b; Zheng et al., 2023). By the same, privacy-enhancing models, such as federated learning, are directly related to sensitive service sectors like finance and healthcare, where data confidentiality is a priority concern (Kong et al., 2024; Zheng et al., 2023). Furthermore, artificial intelligence-based interfaces, e.g., conversational agents and simulation-based planning systems, play a central role in connecting automated systems and human-centered processes (Durach & Gutierrez, 2024; Jackson et al., 2024).

In spite of these notable improvements, many structural and organizational challenges persist. In this regard, studies consistently highlight limitations in data availability, shortage of digital interoperability, high implementation costs, and insufficient technical capabilities among service personnel (Gupta et al., 2022; Purnama et al., 2023; Virmani et al., 2024). Indeed, the high concerns with regard to the opacity and accountability of AI systems are also identified as prominent barriers to widespread adoption (Frederico, 2023; Ronchini et al., 2024). As to ethical issues and bias in decision models, studies demonstrate that they further complicate implementation, particularly in sectors involving vulnerable populations (Azadi et al., 2023; Goodarzian et al., 2023).

Furthermore, this systematic review shows that research remains unevenly distributed across service domains such as healthcare. On the contrary, vital domains such as e-commerce, transportation, and financial services are considered, to some extent, marginalized in academic investigations and queries (Frederico, 2023; Jauhar et al., 2024; Sharma et al., 2024). Accordingly, few studies pay adequate attention to integrating technical, organizational, and societal outcomes related to AI-driven transformation in service supply chains (Belhadi et al., 2024; Brintrup et al., 2024).

Particularly, the present study addresses these gaps by adopting a systematic review. Within this frame, both quantitative and qualitative methodological approaches were employed in this research to get a better insight into the interplay between artificial intelligence, performance outcomes, and supply chain management within service-based industries. In the quantitative phase, a bibliometric analysis of 61 peer-reviewed articles published between 2019 and 2024 was performed using Biblioshiny and VOSviewer to uncover structural trends and collaborative patterns. While a qualitative synthesis of 25 full-text articles was utilized to deepen understanding of AI techniques employed, types of performance improvements observed, and sector-specific challenges encountered.

Within operational environments, despite the rising applications of artificial intelligence, there is still a lack of understanding of the mechanisms and conditions wherein AI improves performance for supply chains operating in the service sector. Recent studies often concentrate on unrelated technological or sectoral aspects, yet it does not present an inclusive, empirically supported framework that combines technical expertise, organizational readiness, and industrial-specific shortcomings.

Therefore, the main research questions which guide the line of this systematic review research are presented as follows:

- How does artificial intelligence contribute to the performance of supply chains operating in service-based sectors?
- What organizational, technological, and contextual factors enable or hinder its effective implementation?
- How are research efforts on AI in service supply chains structured thematically and conceptually across the existing academic landscape?

By answering these questions, the study aims at engendering an integrated and evidence-based understanding of the strategic role AI plays in transforming service supply chains and to outline the avenues for future empirical and theoretical research.

To form a robust theory foundation for this paper, the research uses two interplaying paradigms that have been recently customized for artificial intelligence-assisted supply chains: the Organizational Information Processing Theory (OIPT) and the Dynamic Capabilities Framework (DCF).

With the Organizational Information Processing Theory (OIPT), organizations that operate in uncertain and information-rich environments, in the case of service-oriented supply chains, must develop abilities for capturing, processing, and interpreting complex data for effective coordination and response (Tiwari et al., 2024; Yu et al., 2021). Here, artificial intelligence is characterized as an advanced information-processing mechanism that enhances decision-making accuracy, provides real-time understanding, and encourages adaptive response to changes in the environment (Gupta et al., 2021; Virmani et al., 2024). Recent research in the fields of healthcare and logistics suggests that analytics driven by AI increase resilience and operational agility in the face of changing conditions (Tiwari et al., 2024; Yu et al., 2021).

Strategically, the Dynamic Capabilities Framework (DCF) outlines the process that firms employ in linking AI technologies to identify, exploit, and reposition opportunities in fast-changing environments (Teece, 2020, 2023). This addition of AI significantly enhances these dynamic capabilities through enabling firms to anticipate shifts in demand, take advantage of innovative prospects, and re-engineer value chains in real-time (Belhadi et al., 2024; Modgil et al., 2022a; Ronchini et al., 2024).

Together, both of these conceptual perspectives emphasize the bifunctionality of artificial intelligence in service-oriented supply chains: firstly, as an information processing enabler that facilitates coordination and operational efficiency improvement; and secondly, as an engine of strategic competence that enhances agility, resilience, and long-term competitiveness. This conceptual synthesis forms the basis of the analytical structure guiding this systematic review.

2. Methodology

This systematic literature review seeks to identify the impact of Artificial Intelligence (AI) on supply chain performance within service-oriented industry sector. The methodological approach employed in this research is largely inspired from well-established frameworks for systematic reviews, mainly those suggested by Tranfield et al. (2003), Kitchenham et al. (2009), and the PRISMA 2020 guidelines (Page et al., 2021), to ensure that the study meets research ethics mainly transparency, replicability, and academic rigor.

Hence, the review process revolves around three major objectives:

1. Identifying peer-reviewed academic literature linking AI with performance outcomes in service supply chains;
2. Classifying the studies according to AI methods, performance metrics, and service sectors;
3. Synthesizing both quantitative patterns and qualitative insights. This dual analytical perspective combines the methodological clarity promoted by Abdel-Aty and Negri (2024) with the structured review principles advocated by Yazdi et al. (2023).

With respect to scientific evidence, this study utilizes the exposition- and inductively oriented method, whose goal is the creation of theoretical insights through the observation of previously existing empirical evidence rather than the testing of grounded hypothesis. Exposition logic enables the study to define, interpret, and categorize existing information on AI deployment across service supply chains, and the inductively oriented perspective enables the determination of patterns as well as conceptual insights gleaned from the literature surveyed (Donthu et al., 2021; Paul & Criado, 2020; Snyder, 2019).

This particular methodology aligns with recent advancements in systematic review techniques, which prioritize an evidence-based framework for conceptual development and theoretical construction through cumulative interpretation rather than the traditional hypothesis testing approach (Tiwari et al., 2024; Yu et al., 2021). Such a synergistic rationale guarantees that the results are firmly rooted in empirical data while simultaneously facilitating analytical integration, thus conforming to current standards for qualitative and bibliometric review methodologies.

The analysis was implemented in two separated, but complementary phases. Therefore, a bibliometric analysis was conducted on a range of 61 articles, aimed at mapping the scientific production on the topic and identifying influential contributions, keywords, and thematic clusters. The thematic content analysis focused on 25 articles chosen for their relevance and conceptual depth, with the aim of eliciting detailed qualitative evidence regarding the application of AI tools, performance impacts, and sector-specific challenges in service supply chains.

2.1. Review planning

The main major scientific databases used in the literature search are: Web of Science (WoS) and Scopus. The reason behind opting for these platforms is attributed to their extensive coverage of scholarly publications in fields relevant to this study such as management, economics, healthcare, logistics, and supply chain disciplines. The search strategy is limited to four major concepts that reflect the scope of the review: artificial intelligence, supply chain, performance, and services. Accordingly, the following queries were applied:

- Web of Science: Topic = (Artificial intelligence supply chain OR AI supply chain) AND Topic = (performance) AND Topic = (service*);
- Scopus: (TITLE-ABS-KEY (Artificial intelligence supply chain) OR TITLE-ABS-KEY (AI supply chain)) AND TITLE-ABS-KEY (performance) AND TITLE-ABS-KEY (service*).

The period of consideration for publication ranges from 2019 to 2024, focusing on the most recent and most important developments related to the incorporation of artificial intelligence in service-driven supply chains. The focus is significant due to the worldwide COVID-19 pandemic, which has accelerated the reliance on innovative technologies in various industries. Literature shows that the pandemic served as a powerful stimulus for accelerating the pace of digital transformation and artificial intelligence-driven systems for enhancing supply chain visibility, responsiveness, and resilience in sectors like e-commerce, healthcare, and logistics services (Modgil et al., 2022a). The pandemic revealed inherent weaknesses in supply chains worldwide. It highlighted the fundamental need for adaptive, data-driven approaches that were capable of effectively mitigating insecurities as well as unforeseen disruptions (Ivanov, 2021). Artificial intelligence has therefore attracted interest not just as a technological innovation but also as a strategic paradigm for enhancing adaptive capabilities and redesigning supply chain operations in real-time (Mishra & Sant, 2021; Modgil et al., 2022b). These inquiries resulted in a preliminary list of 2228 articles from Web of Science and 199 from Scopus, totaling 2427 records.

2.2. Study selection protocol

The selection process strictly adhered to the PRISMA methodology, with exclusions systematically recorded and illustrated in Figure 1. After merging both databases, a total of 2427 articles were selected. During the initial filtering stage, 430 articles published outside the 2019–2024 range were removed, resulting in 1849 articles in WoS and 148 in Scopus. Also, an additional 23 non-English articles were not taken into consideration, leaving only 1832 and 142 respectively. Next, 702 chronicles not classified as journal articles were excluded. This selection process resulted in 1222 journal articles in WoS and 50 in Scopus.

A subject-area filter retained only studies within the fields of business, management, health sciences, and logistics. This led to the exclusion of 758 records and the retention of 497 articles from WoS and 17 from Scopus, for a total of 514. After removing 11 duplicates, 503 unique articles remained. To further develop the selection and identify core academic sources, Bradford's Law was applied using Biblioshiny, as recommended by Yazdi et al. (2023). This step excluded 189 articles, resulting in a reduced dataset of 314. A detailed screening of titles, author keywords, and keywords plus eliminated 204 articles that lacked direct relevance, leaving 110. Abstract screening led to the exclusion of 48 additional articles, leaving 61 eligible records.

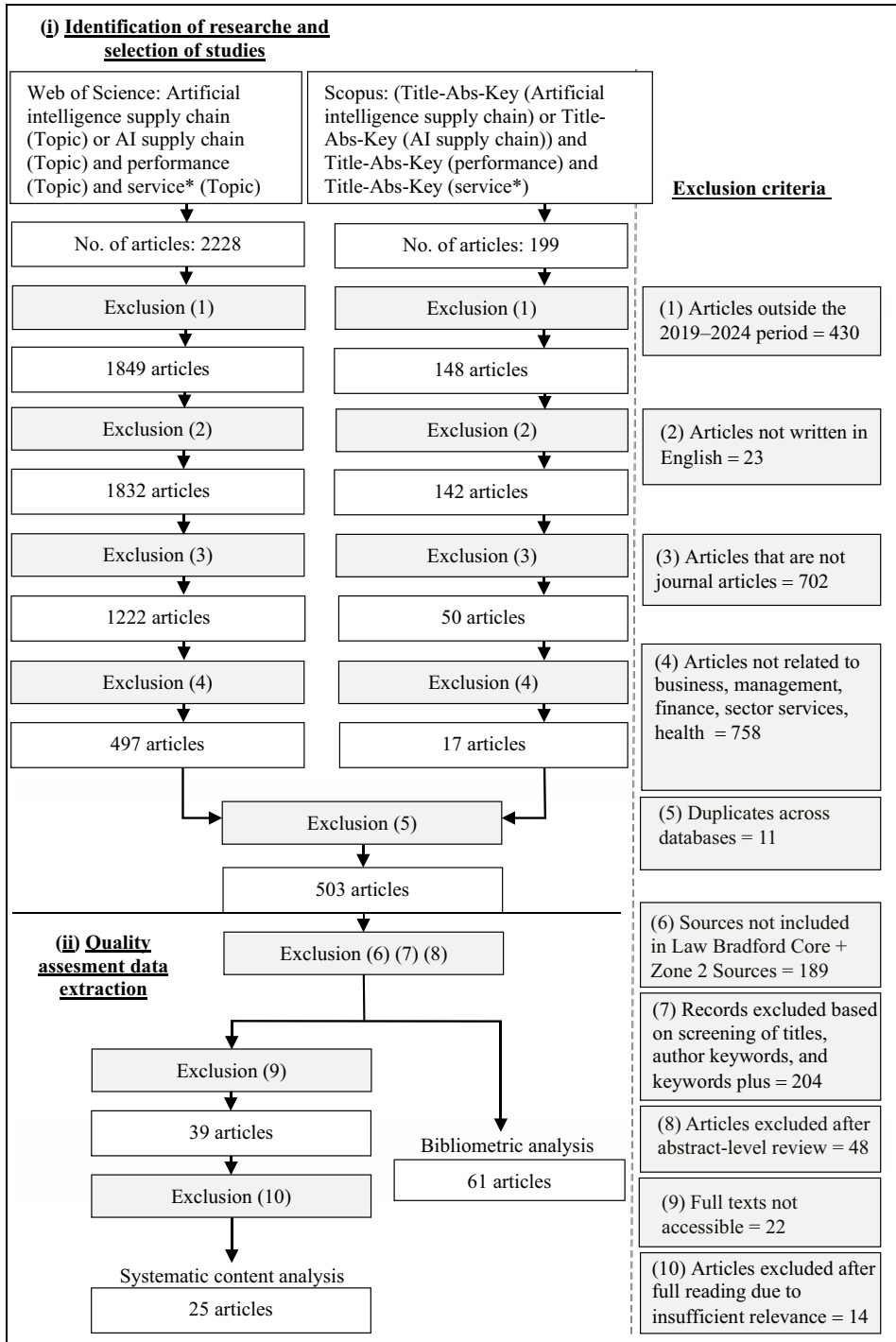


Figure 1. PRISMA 2020 flow diagram for article selection process

2.3. Data analysis approach

To effectively address the dual objectives of this systematic review, the analysis was designed using a two-pronged approach. Firstly, it presents a quantitative snapshot of prevailing literature through the use of an application of bibliometric analysis designed to uncover trends within the literature, such as citation figures, publication patterns, and thematic clustering. This component helped establish a structured overview of the field's scope and evolution. Second, the qualitative phase was carried out via a content analysis to find recurring key themes and identify underlying patterns among the selected articles. Together, these twofold approaches enabled the researcher to obtain a general overview of the structural landscape and conceptual richness of the selected literature.

The bibliometric analysis encompasses a set of 61 filtered articles. This analysis was executed using Bibliometrix package in RStudio, complemented by its user-friendly web-based interface, Biblioshiny (Aria & Cuccurullo, 2017). The aim of this analytical phase is to quantitatively assess the structural characteristics of the literature under investigation. Precisely, it examined annual publication trends to generate growth patterns and assess the impact of publication sources through citation metrics. This bibliometric analysis also provides more visions regarding author productivity and collaboration networks, it helps the researcher map institutional and geographical contributions to the research field. As far as keyword co-occurrence networks are concerned, they were constructed to detect frequently associated topics and terminologies. In line with the methodological guidance provided by Yazdi et al. (2023), VOSviewer was also utilized to complement and validate these findings. This specialized software enabled the researcher to create an advanced visualizations for exploring co-citation patterns and bibliographic coupling. The latter elaborates on how often two sources are cited together and how often two sources cite the same documents. Essentially, these visual tools are significant in the sense that they identify and cross-validate thematic clusters and academic relations within the examined literature.

Complementing the quantitative phase, a manual thematic content analysis was performed on a subset of 25 articles selected for their conceptual depth and alignment with the research focus. A comparative matrix was developed to systematically synthesize, for each article, the following elements: (1) the reference (authors and year), (2) the main objective, (3) the service sector addressed, (4) the type of AI method used (e.g., machine learning, deep learning, no-code AI), (5) the performance dimension targeted (organizational, operational, financial, or resilience-related), (6) key findings, and (7) sector-specific challenges and managerial implications.

3. Findings of the bibliometric analysis

This section presents the results of a two-method study conducted to address the main research questions of the project: to what extent does Artificial Intelligence (AI) enhance supply chain performance in service sectors, and what specific obstacles hinder its adoption? The study combined a bibliometric assessment of 61 peer-reviewed articles with a qualitative synthesis of 25 full-text articles selected for their conceptual significance and methodological rigor.

The bibliometric phase provides a systematic and quantitative review of the scholarly literature, highlighting major publication trends, key journals, the most productive authors,

collaboration networks, and thematic directions. The findings illustrate the intellectual evolution and collaborative frameworks supporting research on artificial intelligence in service-oriented supply chains, following the methodological guidelines established by Donthu et al. (2021) and Zupic and Čater (2015). The study includes both quantitative mapping and a qualitative component using thematic content analysis. This analysis examines the specific AI techniques used, the types of performance outcomes measured, whether operational, strategic, or financial, and the challenges encountered in the service sector, such as healthcare, finance, logistics, and related fields. This synthesis is based on established frameworks for evidence-based evaluations (Snyder, 2019; Tranfield et al., 2003) and is underpinned by a protocol-based data extraction process.

The two analysis phases together give a complete response to the questions of research posed. The two phases offer a broad snapshot of the field, as well as a detailed appreciation of the practical issues involved in using AI in service sector supply chains. The results are structured around two broad sections: the first section gives the bibliometric results, and the second reports the thematic synthesis of the qualitative analysis of the chosen studies.

3.1. Bibliometric analysis of research on ai in service supply chains

This Section presents the bibliometric findings derived through the analysis of 61 research papers concerning the application of Artificial Intelligence (AI) in supply chains that serve the service industries. The analysis gives a structural overview of publication trends, major journals, prominent authors, and cooperation networks, thereby presenting a quantitative foundation for positioning future thematic as well as qualitative analyses. The findings are organized systematically under four dimensions: publication count, journal performance, scientific influence, and cooperation patterns.

3.2. Annual scientific output

Table 1 provides the growth of scientific production from 2019 to 2024. The category began slowly, with only two articles published in 2019 and one in 2020. A gradual build-up is observed starting from 2021 (three articles), and then a rapid growth in 2022 (seven articles). Interestingly, publication figures grew substantially in 2023, with 17 articles and a peak of 31 articles in 2024. This rising pattern reflects growing academic interest in AI's role in service-sector supply chains. The steep increase in the past couple of years reflects the heightened attention to digital transformation and the post-pandemic imperative to improve supply chain resiliency, responsiveness, and performance using AI-based solutions.

Table 1. Annual scientific production (2019–2024)

Year	Articles
2019	2
2020	1
2021	3
2022	7
2023	17
2024	31

3.2.1. Notable publication outlets and their scientific impact

Table 2 presents the journals that are most actively contributing to this research area. The International Journal of Production Research ranks first, with 10 published articles, followed by the Journal of Business Research with seven articles, and the International Journal of Production Economics with five. This distribution highlights a multidisciplinary platform that integrates operations research, business management, and logistics research.

Table 2. Leading journals in the dataset

Sources	Articles	Sources	Articles
International Journal of Production Research	10	Expert Systems with Applications	2
Journal of Business Research	7	Industrial Marketing Management	2
International Journal of Production Economics	5	Journal of Business Logistics	2
Annals of Operations Research	4	Journal of Enterprise Information Management	2
IEEE Transactions on Engineering Management	4	Logistics-Basel	2
International Journal of Physical Distribution & Logistics Management	4	International Journal of Operations & Production Management	1
Technological Forecasting and Social Change	4	International Journal of Quality & Reliability Management	1
International Journal of Logistics Management	3	Journal of Modelling in Management	1
Transportation Research Part E-Logistics and Transportation Review	3	Operations and Supply Chain Management – An International Journal	1
European Journal of Operational Research	2	Operations Management Research	1

Additional insights found in Table 3 emphasize the scholarly impact of these journals through key bibliometric indicators. The International Journal of Production Research not only leads in terms of publication output but also exhibits high citation counts and strong H-index and G-index values, underscoring its central role in disseminating research on artificial intelligence in supply chains. Similarly, journals such as Annals of Operations Research and Technological Forecasting and Social Change contain significant papers that reflect the field's increasing engagement with innovation, sustainability, and digitalization in service contexts.

Table 3. Journal impact indicators

Source	H_index	G_index	M_index	TC	NP	PY_start
International Journal of Production Research	7	10	1.75	254	10	2022
Journal of Business Research	6	7	1.5	227	7	2022
International Journal of Production Economics	5	5	1	138	5	2021

End of Table 3

Source	H_index	G_index	M_index	TC	NP	PY_start
IEEE Transactions on Engineering Management	4	4	2	87	4	2024
International Journal of Physical Distribution & Logistics Management	4	4	0.8	378	4	2021
Technological Forecasting and Social Change	4	4	0.8	344	4	2021
Annals of Operations Research	3	4	1	313	4	2023
International Journal of Logistics Management	3	3	0.75	262	3	2022
Transportation Research Part E – Logistics and Transportation Review	3	3	1.5	23	3	2024
European Journal of Operational Research	2	2	0.5	46	2	2022
Industrial Marketing Management	2	2	0.3333333	85	2	2020
Journal of Business Logistics	2	2	0.28571429	65	2	2019
Expert Systems with Applications	1	2	0.5	7	2	2024
International Journal of Quality & Reliability Management	1	1	0.5	1	1	2024
Journal of Enterprise Information Management	1	2	0.25	10	2	2022
Journal of Modelling in Management	1	1	0.14285714	7	1	2019
Logistics-Basel	1	2	0.3333333	23	2	2023
Operations and Supply Chain Management – An International Journal	1	1	0.3333333	1	1	2023
Operations Management Research	1	1	0.5	1	1	2024

The variety of journals indicates the interdisciplinary nature of the research, representing technical, managerial, and policy-oriented perspectives on the application of artificial intelligence for improving supply chain performance.

3.2.2. Principal references and lead authors

Table 4 presents the top ten most-cited papers in the dataset. Benzidia et al. (2021) is the highest, with 306 citations, followed by Belhadi et al. (2024) with 248 citations. The highest-cited papers are all focused on timely themes such as sustainability, supply chain resilience, and logistics innovation through AI, highlighting their pioneering role in spearheading scholarly discussions.

Table 4. Most cited articles

Paper	Total citations	TC per year	Normalized TC
Benzidia et al. (2021), Technological Forecasting and Social Change	306	61.2	1.789473684
Belhadi et al. (2024), Annals of Operations Research	248	124	13.4877193
Modgil et al. (2022b), The International Journal of Logistics Management	223	55.75	2.659284497
Zouari et al. 2021, International Journal of Physical Distribution & Logistics Management	185	37	1.081871345
Modgil et al. (2022a), International Journal of Physical Distribution & Logistics Management	136	34	1.621805792
Behl et al. (2022), Journal of Business Research	97	24.25	1.156729131
Wamba et al. (2023), International Journal of Production Economics	75	25	2.724358974
Kumar et al. (2020), Industrial Marketing Management	74	12.33333333	1
Olan et al., (2022), International Journal of Production Research	70	17.5	0.834752981
Bag et al. (2023), Journal of Business Research	65	21.66666667	2.361111111

Table 5 identifies Brintrup and Zheng as the most prolific authors, with four papers each, followed by Gupta, Ivanov, and Modgil, with three papers each. Their consistent contribution is evidence of sustained research interest in AI applications for application in service supply chains with emphasis on digital transformation, agility, and data-driven optimization.

Table 5. Most prolific authors

Authors	Articles	Articles fractionalized
Brintrup et al. (2024)	4	1.16666667
Zheng et al. 2024)	4	1.16666667
Gupta et al. (2021)	3	0.66666667
Ivanov (2021)	3	0.91666667
Modgil et al. (2022a)	3	0.83333333
Behl et al. (2022)	2	0.45
Belhad et al. (2024)	2	0.36666667
Dolgui and Ivanov (2025)	2	0.58333333
Chiappetta Jabbour et al. (2019)	2	0.5
Jackson et al. (2024)	2	0.58333333

The co-citation network in Figure 2, also highlights the intellectual foundations powering this discipline. Researchers like Ivanov, Dubey, and Wamba are identified as key authors whose articles are frequently co-cited, reflecting their contributions towards building knowledge for resilience, big data analytics, and sustainability in AI-driven supply chains. Additionally, the inclusion of Brintrup, OpenAI, and Vaswani reflects an increasing intersection between the field of operations management and computer science.

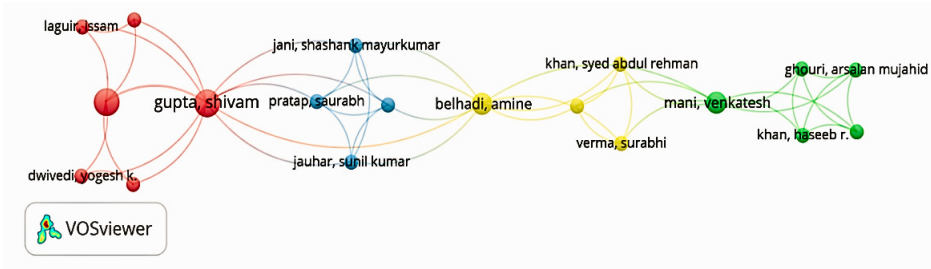


Figure 2. Co-citation network

3.2.3. International research networks and scholarly collaboration patterns

Figure 3, displays the co-authorship network, pointing to structured but rather fragmented research communities. In the center of the red cluster, Shivam Gupta has frequent collaborations with Vogesh K. Dwivedi and Issam Laghdir, working on artificial intelligence-enabled digital transformation in service operations, particularly in emerging economies. Another prominent cluster, headed by Amine Belhadi, addresses AI applications with a focus on sustainability, with collaboration partners like Saurabh Pratap and Syed Abdul Rehman Khan. A third group, consisting of Ghouri, Khan, and Mani, focuses on applied research in operational optimization, resilience modeling, and healthcare logistics.

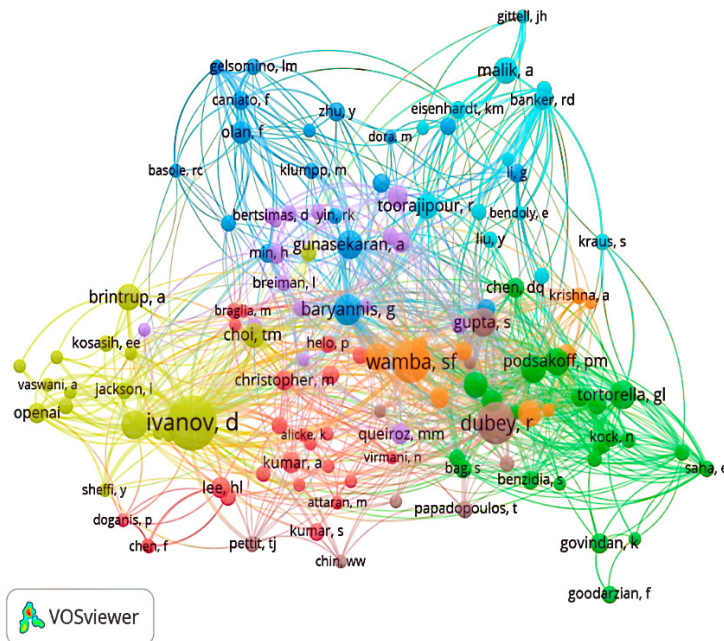


Figure 3. Co-authorship network

Despite the presence of such joint centers, the network remains reasonably spread out, meaning interdisciplinary and international links have yet to solidify in this field of research. At the international level, Figure 4, displays cooperation networks among countries. France, England, and India are identified as leading actors, constituting focal nodes in international academic cooperation. France has intense cooperation links with the USA, China, and India; England has dynamic partnerships with Australia and the UAE; whereas India bridges both European and Asian connections. These affiliations portray growing international integration of artificial intelligence research projects in service-sector value chains.

The overall bibliometric results offer a structured view of the scientific output, knowledge contributions, and collaborative networks essential to informing research on artificial intelligence in supply chains within the services sector. Following this quantitative analysis, the following section discusses the thematic framework of the literature, emphasizing the conceptual foundations and principal themes underpinning scholarly research.

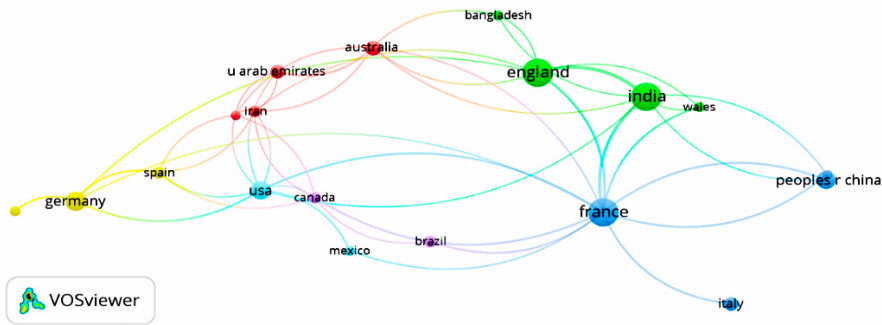


Figure 4. International collaboration map

3.3. Thematic analysis

Following on from the structural outline established in the bibliometric analysis, this section develops the conceptual underpinning of the literature based on keyword co-occurrence patterns, thematic clusters, and intellectual relationships. These analyses collectively enhance our understanding of key subjects, emerging trends, and significant research gaps in the field.

3.3.1. Dominant keywords and their co-occurrence

The co-occurrence network in Figure 5, maps the centrality of important terms throughout the corpus. Not surprisingly, artificial intelligence emerges as the hub, underpinning a variety of research streams around the influence of AI on supply chains in the service sector. Associated terms such as machine learning, deep learning, artificial neural networks, and analytics constitute a technical cluster indicating the focus on predictive modeling and optimization technologies. A second group of associated ideas connects supply chain resilience, performance metrics, big data analytics, and COVID-19 impacts under a general theme of disruption management and organizational agility. The integration of generative AI with organizational information processing capabilities represents a significant advancement in leveraging high-level cognitive technology to enhance agility within complex service systems.

At the application level, keywords such as healthcare, supply chain services, consumer returns, and B2C mark top industries that are adopting AI tools. Minor nodes such as blockchain, chatbots, and federated learning, however, mark rising trends around decentralization, data privacy, and automation in supply chains based on services. To supplement this map, the word cloud in Figure 6, reinforces these results: supply, chain, artificial, intelligence, and AI are the most frequent terms. The other keywords, performance, healthcare, sustainable, and learning, emphasize the twin technological and sectoral priorities emphasized in recent studies.

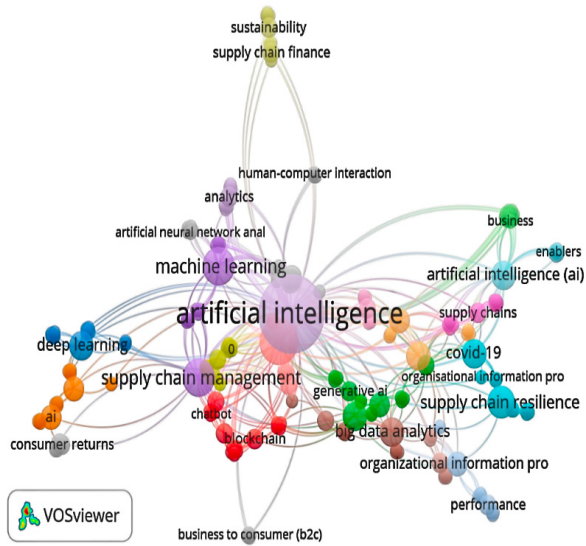


Figure 5. Keyword co-occurrence network



Figure 6. Word cloud from article titles

Table 6 quantifies these trends, which confirm that supply chain (10 occurrences) and artificial intelligence (29 occurrences) are the most salient keywords, followed by machine learning (7), deep learning (4), big data analytics (4), and federated learning (3). This spread reflects the literature's emphasis on AI-enabled enhancement in performance, particularly in resilience, healthcare, and sustainability contexts.

Table 6. Frequency of author keywords

Words	Occurrences	Words	Occurrences
artificial intelligence	29	supply chain performance	4
supply chain	10	federated learning	3
machine learning	7	resilience	3
supply chain management	7	performance	2
COVID-19	5	supply chain finance	2
supply chain resilience	5	sustainability	2
artificial intelligence (ai)	4	sustainable development	2
big data analytics	4	service and manufacturing firms	1
deep learning	4	supply chain services	1
healthcare	4	sustainable supply chain	1

3.3.2. Thematic map and clusters

The theme map in Figure 7, illustrates a conceptual model for organizing the research domain into four quadrants that are differentiated:

- **Central topics:** Artificial intelligence, machine learning, supply chain effectiveness, and resilience are among the topics with high centrality and density values, indicating their significant contributions to the academic discussion. Some of the key contributions in this field include research by Belhadi et al. (2024) and Modgil et al. (2022a), which emphasize the effects of AI on supply chain agility and resilience.
- **Core topics:** Healthcare logistics research fields, decision-support systems, and digitalization are a few of the key but still developing fields of investigation. Innovative work by Benzidia et al. (2021) and Ortiz-Barrios et al. (2023) points to the continuous integration of artificial intelligence technologies in healthcare and service logistics contexts.
- **Emerging or declining themes:** Concepts such as explainable AI, ethical AI, and supply chain finance fall in the lower-centrality and density quadrant, meaning developing or less trending topics which are still gaining academic traction (Brintrup et al., 2024; Ronchini et al., 2024).
- **Niche topics:** Domains like simulation models, optimization algorithms, and conversational AI exhibit high density with lower centrality, which means that these are technically advanced streams of research with narrower theme breadth (Durach & Gutierrez, 2024; Zheng et al., 2023).

Table 7 consolidates these findings by presenting clusters in order of centrality and density values, thus giving a concise summary of the thematic makeup. The analysis verifies the motor themes' priority while also indicating the neglected areas in ethical governance, financial applications, and simulation-based optimization.

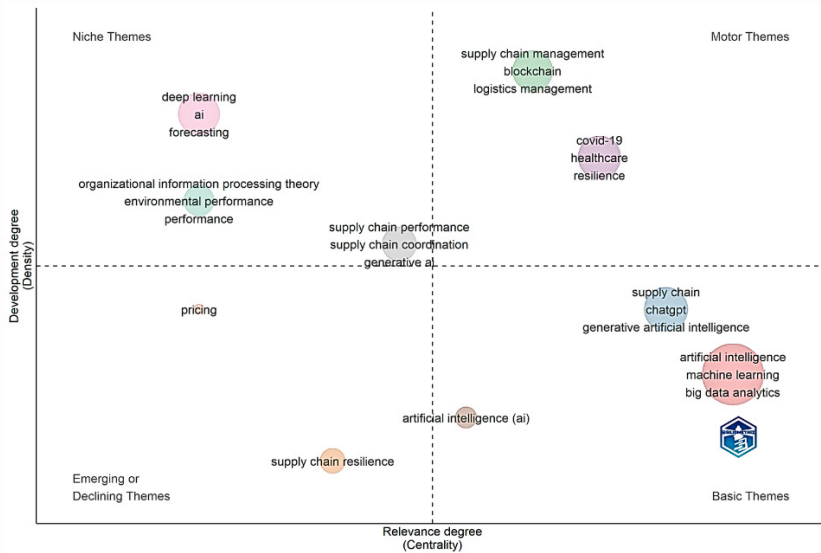


Figure 7. Thematic map of research clusters

Table 7. Summary of thematic clusters

Cluster	Callon centrality	Callon density	Rank centrality	Rank density	Cluster frequency
Artificial intelligence	1.477494331	42.88143829	10	3	49
Supply chain	0.689285714	50	9	4.5	16
Supply chain management	0.416666667	58.92857143	7	10	13
COVID-19	0.558333333	57.91666667	8	8	15
Supply chain resilience	0.116666667	20	4	1	5
Artificial intelligence	0.395833333	25	6	2	4
Deep learning	0	58.88888889	2	9	14
Supply chain performance	0.375	51.38888889	5	6	9
Organizational information processing theory	0	55.55555556	2	7	7
Pricing	0	50	2	4.5	2

3.3.3. Bibliographic coupling and co-citation networks

Utilizing the insights gained from the previously illustrated co-citation analysis in Figure 2, the intellectual relationships across the literature are also further illuminated. Ivanov is a prominent scholarly actor due to his extensive publications on supply chain resilience, disruption analytics, and digital twin systems. Dubey and Wamba also stand out for their ability to link AI, big data, and sustainable supply chain management. Cornerstones like Gunasekaran and Christopher remain core references, demonstrating the longevity of relevance for classical operations management theory. The inclusion of Brintrup, OpenAI, and Vaswani shows the

increasing intersection of supply chain research with AI developments in machine learning and language models.

The bibliographic coupling map in Figure 8, builds on these findings by grouping papers with shared references into thematic clusters:

- Cluster 1: Benzidia et al. (2021), Belhadi et al. (2024), Modgil et al. (2022a), and Behl et al. (2022) are all concerned with leveraging artificial intelligence and big data to enhance agility, sustainability, and digital responsiveness in service supply chains.
- Cluster 2: The research of Jackson et al. (2024), Jauhar et al. (2024), and Durach and Gutierrez (2024) focuses on simulation and conversational AI in retail services and logistics, with an emphasis on decision support, user experience, and human-AI interaction.
- Cluster 3: Azadi et al. (2023), Khosrowabadi et al. (2022), and Yao et al. (2024) studies employ deep learning and hybrid optimization to tackle healthcare logistics forecasting and sustainability problems.
- Establishing relationships: Research by Brintrup et al. (2024), Kong et al. (2024), and Kumar et al. (2020) indicates an increasing interest in federated learning, decentralized artificial intelligence architectures, and risk evaluation in supply chain finance settings.

Collectively, these clusters indicate a research field that is consolidating around significant topics in the service domain, namely resilience, personalization, and performance enhancement, while diversifying into new areas of ethical artificial intelligence, explainability, and finance innovations.

With the integration of structural, conceptual, and intellectual mapping, this thematic analysis provides an overall picture of AI research diversification and development in service sector supply chains. The findings constitute a foundation for the second phase of the review, where the content of 25 chosen articles is qualitatively synthesized to develop an understanding of particular AI applications, performance implications, and industry-specific challenges.

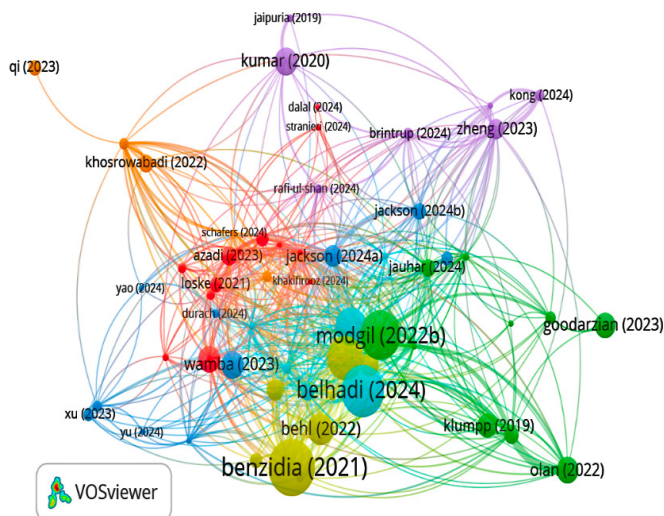


Figure 8. Bibliographic coupling network

4. Thematic content analysis of 25 selected articles

Alongside the bibliometric analysis, an in-depth qualitative evaluation was conducted on a strategically selected sample of 25 full-text papers. The choice of studies was based on methodological soundness, thematic relevance, and importance to the research question. This section of the review offers an in-depth analysis of the utilization of artificial intelligence in service-driven supply chains and its effects on performance outcomes in varied operational contexts. The analysis was guided by a thematic framework constructed through cross-comparison of the selected articles. Six key analytical dimensions emerged, reflecting the diversity and convergence of research perspectives: (1) strategic orientations and research objectives, (2) contributions to operational performance, (3) sectoral applications, (4) AI methods and technical implementations, (5) implementation barriers and organizational challenges, and (6) alignment with the central research question.

To support this analysis, a detailed comparative synthesis was developed and presented in Table 8, summarizing the study's objective, service sector, AI technique used, targeted type of performance, key findings, and implementation challenges for each article. This table serves as a foundation for the thematic interpretations that follow, offering a comprehensive view of both the potential and the constraints of AI in supply chains operating in the service sector.

Table 8. Comparative summary of AI applications and performance outcomes in service sector supply chains

Article	Study objective	Service sector	AI technique used	Type of performance	Key findings	Challenges identified
Ortiz-Barrios et al. (2023)	To optimize ICU bed management during the COVID-19 pandemic by combining AI and discrete-event simulation	Healthcare – intensive care units	Random Forest (RF) + Discrete-Event Simulation (DES)	Operational performance – waiting time reduction	Combined RF-DES model reduced median ICU waiting times by 32 to 48 minutes	Incomplete data; demand uncertainty; inter-departmental coordination issues
Gupta et al. (2021)	To explore how AI-powered information systems enhance supply chain resilience against disruptions	Logistics, energy, healthcare, retail (India)	AI applied to IS: machine learning, deep learning, NLP, digital twins	Organizational resilience – responsiveness, adaptability, system security	AI enhances IS ability to learn from complex data and support resilient SCs	High investment cost; AI talent shortage; cybersecurity concerns; tacit knowledge exclusion

Continue of Table 8

Article	Study objective	Service sector	AI technique used	Type of performance	Key findings	Challenges identified
Jauhar et al. (2024)	To use No-code AI (NCAI) to forecast inventory needs and minimize distortion for resilient SCs	Retail, e-commerce, distribution	No-code AI using random forest regressor	Inventory performance – overstock and stockout reduction	NCAI model shows high accuracy (RMSE = 18.15, R^2 = 0.8143); supports product-level stock planning	Limited customization; minimal technical skill still required; security/integration constraints
Ghuri et al. (2023)	To propose and validate an AI-based omnichannel blood supply chain model to enhance emergency and shortage management	Healthcare (blood donation systems)	ML (stochastic, LSTM, RF)	Operational efficiency, sustainability, availability	89% accuracy in demand prediction; balance between supply and demand improved	Low tech adoption in healthcare, poor emergency coordination, monitoring issues
Belhadi et al. (2024)	To examine how AI-driven innovation impacts SC performance and resilience under high environmental dynamism	Multi-service sectors (logistics, healthcare, etc.)	Predictive ML, adaptive AI capabilities	Resilience, agility, customer responsiveness	AI enhances performance directly and indirectly by strengthening adaptive resilience capabilities	Market uncertainty, tech investment, inter-organizational integration
Virmani et al. (2024)	To develop a decision framework for AI adoption in healthcare supply chains	Healthcare	AI + Big Data + Fuzzy Delphi, DEMATEL, GTMA	Responsiveness, resilience, resource management	20 critical enablers identified; inter-functional coordination and top management support are crucial	Employee resistance, cybersecurity, IT infrastructure, high cost
Benzidia et al. (2021)	To assess the influence of BDA-AI on green SC process integration and environmental performance in hospitals	Healthcare (French hospitals)	BDA + AI (OIPT-based)	Environmental performance	BDA-AI improves internal integration and external environmental collaboration	Lack of data exploitation, weak environmental culture, coordination issues

Continue of Table 8

Article	Study objective	Service sector	AI technique used	Type of performance	Key findings	Challenges identified
Modgil et al. (2022b)	To build an AI-driven resilience framework for SCs during COVID-19	Multi-services (health, IT, retail, etc.)	Digital twin, intelligent agents, predictive control	Operational resilience, visibility, continuity	4-phase framework: Recognize, Analyze, Reconfigure, Activate; supports proactive SC risk management	System heterogeneity, resistance to change, collaboration needs, cybersecurity
Ronchini et al. (2024)	To explore how AI supports innovation in supply chain finance (SCF) processes	Supply chain finance (service & financial providers)	ML, fraud detection, scoring systems, NLP, RPA	Financial performance, process efficiency, risk reduction	AI improves all stages of SCF: evaluation, implementation, automation	Data management, cost of implementation, organizational resistance, bias in algorithms
Modgil et al. (2022a)	To examine how AI can support supply chain resilience by developing dynamic capabilities during the COVID-19 crisis	E-commerce	AI tools: machine learning, automation, demand forecasting, chatbots, RPA, traceability systems	Supply chain resilience – visibility, personalization, disruption reduction	AI improves visibility, supply strategy, customer personalization, and responsiveness	Demand uncertainty; contractual complexity; fast adaptation needed; stock management during crises
Purnama et al. (2023)	To implement an intelligent teledermatology system (ITDS) using AI to improve dermatological diagnostic service chains	Healthcare – teledermatology	Deep learning + Case-Based Reasoning (CBR)	Service performance – diagnostic quality, accessibility, logistical efficiency	Automated skin condition classification improved diagnosis and service flow traceability	Data security; classification reliability; user training needs; limits in remote diagnostics
Zheng et al. (2023)	To develop a federated machine learning model for supply chain risk prediction while preserving data privacy	Maritime engineering (UK buyers sharing suppliers)	Federated Learning (FL): ANN, CNN1D, logistic regression, MLP	Operational resilience – late delivery prediction	FL performs comparably to centralized models; ideal for data-scarce or privacy-sensitive firms	Data imbalance across firms; algorithm choice impacts outcome; shared model may underperform for data-rich partners

Continue of Table 8

Article	Study objective	Service sector	AI technique used	Type of performance	Key findings	Challenges identified
Jackson et al. (2024)	Automatically generate logistics simulations from text	Logistics	Generative AI (GPT-3 Codex)	Automation, modeling speed	Valid models from natural language	Needs human validation, prompt dependency
Azadi et al. (2023)	Predict healthcare SC sustainability using DL & NDEA	Healthcare	DL (NARX, GNGN)	Sustainability, resource allocation	Accurate prediction, identifies weak links	Data reliability, DEA model limitations
Durach and Gutierrez (2024)	Study chatbot AI implications in SC	Logistics services	LLM (ChatGPT)	Efficiency, responsiveness	Automates tasks, improves communication	Hallucinations, user resistance, ethics
Aburayya (2024)	Assess AR's impact on SC performance	Furniture / logistics	ANN + PLS-SEM	Org. performance (efficiency, satisfaction)	AR enhances planning and logistics	Low AR adoption, training needs
Kong et al. (2024)	Predict SCF payment risks using federated learning	Financial / aerospace	FL (ANN, CNN1D)	Risk prediction accuracy	Reliable predictions without data sharing	Data access, class imbalance
Frederico (2023)	Explore ChatGPT uses in SC and propose research agenda	Services (general)	ChatGPT (LLM)	Process optimization, service quality	High potential, limited short-term impact	Low maturity, SC complexity
Zheng et al. (2024)	Adaptive FL for SC info sharing	E-commerce	FL (ANN, CNN1D)	Resilience, prediction accuracy	Outperforms classic FL methods	Heterogeneous data, clustering issues
Bassiouni et al. (2024)	Detect order delays in complex SCs	Distribution / logistics	DL (TCN-1DSPCNN), SVM	Delay detection, decision support	100% accuracy with hybrid model	Overfitting, data preprocessing challenges
Behl et al. (2022)	Study BDAC's role in competitive advantage during COVID-19	MSME services	Big data analytics	Sustainable advantage	Better SC coordination, risk reduction	Resource limits, info sharing reluctance
Loske and Klumpp (2021)	Compare AI, human, and collaboration in routing	Retail logistics	Weak AI (heuristics)	Efficiency (DEA)	Human-AI collaboration is best	Managerial variability, no self-learning AI

End of Table 8

Article	Study objective	Service sector	AI technique used	Type of performance	Key findings	Challenges identified
Goodar-zian et al. (2023)	Design a sustainable, responsive cold vaccine SC	Healthcare	Meta-heuristics (MGWO, VNS)	Cost, CO ₂ , resilience	MGWO best for large-scale problems	Multi-level complexity, demand uncertainty
Jazairy et al. (2024)	Analyze paradoxes of AI in S&OP	Manufacturing / S&OP	ML for S&OP automation	Decision-making, resilience	5 adoption pathways identified	Data silos, change resistance
Sharma et al. (2024)	Analyze Lean + I4.0 impact on service sustainability	Services (IT, banking)	I4.0 (AI, ML, Big Data)	Triple bottom line	Lean + I4.0 outperforms I4.0 alone	Needs strategic orchestration

4.1. Strategic orientations and research objectives

The chosen research activities have the same objective: using Artificial Intelligence (AI) as a catalyst for better performance in service industry supply chains. They, however, pursue alternative strategic directions. A significant number of articles focuses on developing resilience under turbulent conditions, most notably as a reaction to the disruptions brought by the COVID-19 pandemic. For example, Modgil et al. (2022b), Gupta et al. (2021), and Belhadi et al. (2024) examine the role played by artificial intelligence in facilitating dynamic reconfiguration of networks and proactive risk management. Ronchini et al. (2024), Zheng et al. (2023), and Kong et al. (2024) discuss similar subjects through the application of AI approaches to enhance flexibility in financial and logistics frameworks. There are other research works that focus on the importance of accessibility alongside technological innovation. Jauhar et al. (2024) concentrate on no-code AI platforms that enable wider access to advanced analytics, whereas Zheng et al. (2024) and Frederico (2023) discuss the application of conversational and generative AI to improve user engagement and decision-making in complicated service environments.

4.2. Contributions to operational performance

Artificial intelligence is also well established in the literature as an enabler that brings improved accuracy, speed, and overall performance in service supply chains. Jauhar et al. (2024) present evidence of the implementation of no-code AI for minimizing differences in stock levels and enhancing forecast demand in retail settings. Ortiz-Barríos et al. (2023) suggest a hybrid framework that balances machine learning with discrete-event simulation to optimize ICU resource planning in high-pressure settings. Azadi et al. (2023) develop a deep learning model combined with network DEA for assessing healthcare logistics sustainability. Similarly, Bassioni et al. (2024) develop deep learning models for real-time monitoring of order status in complex networks, whereas Aburayya (2024) employs an ANN-PLS model to quantify logistics performance. In retail logistics, Loske and Klumpp (2021) investigate the efficiency gains realized by AI-human collaboration in last-mile delivery routing.

4.3. Sectoral applications in services

In terms of sectors, healthcare is the most researched field, reflecting the paramount importance of AI in improving diagnostic accuracy, maintaining service continuity, and streamlining supply logistics. Virmani et al.'s (2024), Purnama et al.'s (2023), Azadi et al.'s (2023), Goodarzi et al.'s (2023), and Benzidia et al.'s (2021) research offers insights into applications that range from tele dermatology and ICU coordination to vaccine distribution. In finance, Ronchini et al. (2024) and Kong et al. (2024) discuss how artificial intelligence is used for enhanced credit risk analysis and automating supply chain finance decision-making. Parallel logistics and e-commerce research, such as that by Zheng et al. (2024), Durach and Gutierrez (2024), and Frederico (2023), demonstrates the growing use of AI for routing optimization, customer interaction, and adaptive logistics planning.

4.4. AI methods and technical implementations

The literature covered demonstrates a broad range of artificial intelligence techniques, specifically designed for various operational environments, types of data, and decision-making settings. Machine learning and deep learning techniques are at the center stage, especially for classification, prediction, and optimization problems (Azadi et al., 2023; Bassiouni et al., 2024; Benzidia et al., 2021). To meet privacy and decentralization needs, especially in healthcare and finance, federated learning has gained popularity, as discussed by Zheng et al. (2023) and Kong et al. (2024). Models like these facilitate collective intelligence without the need for centralized data sharing. Several studies highlight the significance of accessibility and usability. For instance, Jauhar et al. (2024) discuss no-code AI platforms that empower non-experts to generate predictive insights, effectively lowering the technical barriers to adoption. Hybrid frameworks that combine artificial intelligence with discrete-event simulation (Ortiz-Barrios et al., 2023) or augmented reality (Aburayya, 2024) are also investigated for mimicking real-world dynamics and improved interpretability. Emerging tools like generative artificial intelligence and conversational agents (Durach & Gutierrez, 2024; Frederico, 2023) are a new frontier for interactive and human-centered applications. These methods prioritize the importance of user interaction and feedback processes in real time, which are especially useful in service contexts where responsiveness and customization matter.

4.5. Implementation barriers and organizational challenges

Whereas the advantages of leveraging artificial intelligence are well-known, some long-standing challenges are detailed in the literature. Data-related limitations, such as low data quality, low interoperability, and limited access, are prevalent in decentralized systems as well as in legacy systems (Purnama et al., 2023; Virmani et al., 2024; Zheng et al., 2023). These issues could compromise the validity and generalizability of AI models. Organizational resistance is another significant issue. Research by Gupta et al. (2021), Modgil et al. (2022a), and Sharma et al. (2024) recognizes issues of inadequate technical competencies, excessive upfront capital outlays, and insufficient managerial preparedness. Besides such structural limitations, ethical and regulatory factors also come squarely into play, especially in critical sectors like finance and healthcare. Ronchini et al. (2024) and Frederico (2023) highlight the need for explainable,

transparent, and auditable AI systems to ensure compliance and trust in situations where decisions carry significant human or financial stakes.

4.6. Synthesis and contributions to the research question

The results of this thematic analysis confirm that AI plays a multifaceted role in enhancing the effectiveness of service supply chains. In addition to driving incremental operational efficiencies, AI contributes to comprehensive transformations that foster resilience, sustainability, and strategic agility. However, the effectiveness of AI largely depends on the alignment between technological decisions, organizational capabilities, and contextual preparedness. Ultimately, its success is contingent upon these factors. This review, therefore, provides a complete answer to the primary research question: the influence of artificial intelligence on performance in service supply chains is both profound and complex; yet its successful integration is contingent upon careful balance between innovation, pragmatic application, and ethical regulation. These findings underline the need for a holistic and contextual approach in the design of AI-based solutions for supply chains operating in the services sector.

5. Discussion

This study adopted a dual analytical approach to examine how Artificial Intelligence (AI) contributes to the performance of supply chains operating in service-oriented sectors. The bibliometric analysis offered a macroscopic view of scientific output and intellectual structure, while the qualitative synthesis of 25 full-text articles provided detailed insights into application contexts, implementation challenges, and performance outcomes. Together, these complementary methods allowed for a comprehensive response to the central research questions. The next section further details these findings in order to build connections amongst the two analytical levels and to analyze the main observations that emerge from their integration.

5.1. Integrative interpretation of findings

The findings from both the quantitative mapping of bibliometrics and the qualitative synthesis simultaneously provide a structured understanding of the way in which Artificial Intelligence (AI) transforms supply chain dynamics for service-based industries. Both these complementary viewpoints, quantitative mapping and qualitative synthesis, present a unified answer to the research questions, with emphasis on structural pattern as well as interpretative depth.

On a larger scale, the bibliometric analysis of 61 papers reveals a consistent scholarly production build-up from 2021, with increasing focus on issues such as resilience, big data, and digitalization. Network studies (Figures 2–5) reveal community development of collaborative research networks, but still, the communities remain divided.

5.2. Theoretical and practical implications

The integration of the findings of the pertinent analysis suggests a deep orientation shift: artificial intelligence is increasingly no longer solely viewed as a technological tool but also as an organizational transformations enabler. The findings of the bibliographic coupling analysis

(Figure 8) affirm that the prevailing research tends to associate technological evolution with management and governance systems (Belhadi et al., 2024; Ronchini et al., 2024).

This evolution is in line with dynamic capability and organizational information processing frameworks by Teece (2023), Tiwari et al. (2024), and Yu et al. (2021), who all highlight that firms achieve competitive advantage by integrating data-informed intelligence with learning-based adaptive systems. From the standpoint of policymakers and management practitioners, it implies that successful deployment of AI in service supply chains is not just about investment in algorithms but also in large-scale data infrastructure, skill development of the workforce, and moral governance architecture.

From a management perspective, we observe that:

- Decision-makers should promote cross-functional integration between IT, operations, and service departments.
- The governments and the public agencies can incentivize open data ecosystems for enabling responsible AI innovation.
- It is critical that leaders in industry raise standards around ethics and transparency, especially in data-sensitive areas such as healthcare and finance.

5.3. Future research directions and policy advocacy

From these results, several avenues for future research follow. Initially, empirical research must investigate the progression of AI-enhanced educational systems throughout time, thereby documenting the longitudinal impacts on both performance and resilience. Second, more studies could examine AI governance mechanisms, specifically organizational adoption and trust as affected by transparency and accountability. Thirdly, comparative studies across different sectors are necessary to examine the variances among service domains, which encompass healthcare, retail, logistics, and financial services.

On the policy front, governments and multilateral institutions must:

- Develop public-private partnerships to accelerate AI innovation in public service supply chains (e.g., healthcare, transport, energy);
- Establish sandboxes for regulation that permit experimentation with AI models while preserving moral standards;
- Develop skill-building initiatives to bridge the digital skill deficit and achieve just AI diffusion in new economies.

Ultimately, the paper highlights that the long-term sustainability of AI in service supply chains hinges on technological maturation as well as institutional preparedness. Enhancing ethical, educational, and infrastructure policies shall become imperative in optimizing AI's transformative potential in service ecosystems.

These findings, in combination, support that the value of artificial intelligence in service supply chains is contingent on the optimal matching of technological advancement, human potential, and governance institution systems. On the basis of these premises, the following conclusion summarizes the key findings of this review in outline while also highlighting its wider scholarly and managerial significances.

6. Conclusions

This systematic review literature investigated the role that artificial intelligence can have in the improvement of supply chain performance in service-driven industries. This book not just integrates earlier dispersed work, but provides a systematic, multi-dimensional account of the ways service supply chains are reshaped through artificial intelligence, both the technical and the managerial angles. By integrating a quantitative bibliometric mapping approach with an interpretive content analysis, the book creates a cohesive narrative connecting the intellectual and practical history of the topic over the last five years. Through the integration of a bibliometric analysis of 61 publications and qualitative synthesis of 25 full-text articles, the review offers a wide-ranging vision of the intellectual underpinnings, thematic trajectories, and practical uses within the discipline.

The results indicate that artificial intelligence is viewed not just as a technological tool but also as a transformative force in service supply chains. Technologies such as machine learning, conversational agents, and simulation-based platforms contribute to increased efficiency, flexibility, sustainability, and customer engagement. In addition to these performance results, AI is increasingly framed as a strategic facilitator of organizational change. Adoption is frequently accompanied by better decision-making quality, risk management, and resource allocation, indicating a move beyond algorithmic performance toward system-level integration. Above all, the interaction among data infrastructures, human expertise, and ethical governance comes as a key arbitrator between the success and failure of AI adoption in service industries. Interestingly, sector-specific determinants, i.e., the severity of data leverage in healthcare or the volatility inherent in retail and finance, influence both the deployment and the ensuing performance measures of AI projects. Although these outcomes give detailed information on the contribution from artificial intelligence, they also indicate that the coverage of academic studies is not balanced across various sectors as well as approaches. Some service areas, like education, tourism, and hospitality, are under-represented, indicating the possibilities for future empirical work. Though extremely thorough in coverage, this review is not without its limitations. The inclusion criteria restricting analysis to English-language articles published between 2019 and 2024 may have potentially excluded older or non-English research. Moreover, access limitations led to the exclusion of 22 potentially relevant articles. Manual thematic screening is also subjective and risks introducing bias. Finally, while tools such as Biblioshiny and VOSviewer yield structured conclusions, they may fail to capture emerging or interdisciplinary trends that are less cited.

Future research needs to examine the long-term organizational effects of implementing artificial intelligence, especially with regard to human preparedness, information management, and inter-industry collaboration. Furthermore, empirical investigations must be broadened to under-studied service sectors and geographical regions. Moreover, ethical and legal factors, including algorithmic transparency, data security, and ethical use of artificial intelligence, need to be dealt with to facilitate the inclusive and sustainable application of AI in service-based supply chains. From the policy and management point of view, companies and regulators must pay attention to building ethical and governance frameworks that offer transparency, accountability, and human-AI complementarity. In the next decades, inter-sector

collaborations and capacity-development initiatives that equip service sectors with the digital and analytical skills appropriate to sustaining AI-fueled transformation should be the subject of further research. Ultimately, the blending of technological innovation with the human, ethical, and institutional factors will be paramount in the building of a more adaptive, inclusive, and resilient service economy.

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Author contributions

El Mehdi Badre: bibliometric analysis and discussion of results; Slimane Sidouna: methodology and qualitative analysis; Hind Chahbar: manuscript formatting and layout; Adnane Mrabti: language editing and proofreading (English); Abdelali Lahrech: scientific supervision and validation.

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References

- Abdel-Aty, T. A., & Negri, E. (2024). Conceptualizing the digital thread for smart manufacturing: A systematic literature review. *Journal of Intelligent Manufacturing*, 35, 3629–3653. <https://doi.org/10.1007/s10845-024-02407-1>
- Aburayya, A. (2024). Analysing the influence of augmented reality on organization performance via supply and logistics value chain functions: A hybrid ANN-PLS model assessment in the Gulf Cooperation Council Region. *Logistics*, 8(4), Article 110. <https://doi.org/10.3390/logistics8040110>
- Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Azadi, M., Yousefi, S., Saen, R. F., Shabanpour, H., & Jabeen, F. (2023). Forecasting sustainability of health-care supply chains using deep learning and network data development analysis. *Journal of Business Research*, 154, Article 113357. <https://doi.org/10.1016/j.jbusres.2022.113357>
- Bag, S., Dhamija, P., Singh, R. K., Rahman, M. S., & Sreedharan, V. R. (2023). Big data analytics and artificial intelligence technologies based collaborative platform empowering absorptive capacity in health care supply chain: An empirical study. *Journal of Business Research*, 154, Article 113315. <https://doi.org/10.1016/j.jbusres.2022.113315>
- Bassiouni, M. M., Chakraborty, R. K., Sallam, K. M., & Hussain, O. K. (2024). Deep learning approaches to identify order status in a complex supply chain. *Expert Systems with Applications*, 250, Article 123947. <https://doi.org/10.1016/j.eswa.2024.123947>
- Behl, A., Gaur, J., Pereira, V., Yadav, R., & Laker, B. (2022). Role of big data analytics capabilities to improve sustainable competitive advantage of MSME service firms during COVID-19 – a multi-theoretical approach. *Journal of Business Research*, 148, 378–389. <https://doi.org/10.1016/j.jbusres.2022.05.009>
- Belhadi, A., Mani, V., Kamble, S. S., Khan, S. A. R., & Verma, S. (2024). Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain

- dynamism: An empirical investigation. *Annals of Operations Research*, 333(2), 627–652. <https://doi.org/10.1007/s10479-021-03956-x>
- Benzidia, S., Makaoui, N., & Bentahar, O. (2021). The impact of big data analytics and artificial intelligence on green supply chain process integration and hospital environmental performance. *Technological Forecasting and Social Change*, 165, Article 120557. <https://doi.org/10.1016/j.techfore.2020.120557>
- Brintrup, A., Kosasih, E., Schaffer, P., Zheng, G., Demirel, G., & MacCarthy, B. L. (2024). Digital supply chain surveillance using artificial intelligence: Definitions, opportunities and risks. *International Journal of Production Research*, 62(13), 4674–4695. <https://doi.org/10.1080/00207543.2023.2270719>
- Chiappetta Jabbour, C. J., Sobreiro, V. A., Lopes de Sousa Jabbour, A. B., de Souza Campos, L. M., Mariano, E. B., & Renwick, D. W. S. (2019). An analysis of the literature on humanitarian logistics and supply chain management: Paving the way for future studies. *Annals of Operations Research*, 283, 289–307. <https://doi.org/10.1007/s10479-017-2536-x>
- Dolgui, A., & Ivanov, D. (2025). Internet of behaviors: Conceptual model, practical and theoretical implications for supply chain and operations management. *International Journal of Production Research*, 63(1), 1–8. <https://doi.org/10.1080/00207543.2024.2372008>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Durach, C. F., & Gutierrez, L. (2024). “Hello, this is your AI co-pilot” – operational implications of artificial intelligence chatbots. *International Journal of Physical Distribution & Logistics Management*, 54(3), 229–246. <https://doi.org/10.1108/IJPDLM-01-2024-0031>
- Frederico, G. F. (2023). ChatGPT in supply chains: Initial evidence of applications and potential research agenda. *Logistics*, 7(2), Article 26. <https://doi.org/10.3390/logistics7020026>
- Ghouri, A. M., Khan, H. R., Mani, V., ul Haq, M. A., & de Sousa Jabbour, A. B. L. (2023). An artificial-intelligence-based omnichannel blood supply chain: A pathway for sustainable development. *Journal of Business Research*, 164, Article 113980. <https://doi.org/10.1016/j.jbusres.2023.113980>
- Goodarziyan, F., Navaei, A., Ehsani, B., Ghasemi, P., & Muñuzuri, J. (2023). Designing an integrated responsive-green-cold vaccine supply chain network using Internet-of-Things: Artificial intelligence-based solutions. *Annals of Operations Research*, 328, 531–575. <https://doi.org/10.1007/s10479-022-04713-4>
- Gupta, S., Modgil, S., Bhattacharyya, S., & Bose, I. (2022). Artificial intelligence for decision support systems in the field of operations research: Review and future scope of research. *Annals of Operations Research*, 308, 215–274. <https://doi.org/10.1007/s10479-020-03856-6>
- Gupta, S., Modgil, S., Meissonier, R., & Dwivedi, Y. K. (2021). Artificial intelligence and information system resilience to cope with supply chain disruption. *IEEE Transactions on Engineering Management*, 71, 10496–10506. <https://doi.org/10.1109/TEM.2021.3116770>
- Ivanov, D. (2021). Digital supply chain management and technology to enhance resilience by building and using end-to-end visibility during the COVID-19 pandemic. *IEEE Transactions on Engineering Management*, 71, 10485–10495. <https://doi.org/10.1109/TEM.2021.3095193>
- Jackson, I., Jesus Saenz, M., & Ivanov, D. (2024). From natural language to simulations: Applying AI to automate simulation modelling of logistics systems. *International Journal of Production Research*, 62(4), 1434–1457. <https://doi.org/10.1080/00207543.2023.2276811>
- Jauhar, S. K., Jani, S. M., Kamble, S. S., Pratap, S., Belhadi, A., & Gupta, S. (2024). How to use no-code artificial intelligence to predict and minimize the inventory distortions for resilient supply chains. *International Journal of Production Research*, 62(15), 5510–5534. <https://doi.org/10.1080/00207543.2023.2166139>
- Jazairy, A., Shurrab, H., & Chedid, F. (2024). Impact pathways: Walking a tightrope – unveiling the paradoxes of adopting artificial intelligence (AI) in sales and operations planning. *International Journal of Operations & Production Management*, 45(13), 1–27. <https://doi.org/10.1108/IJOPM-07-2024-0582>
- Khosrowabadi, N., Hoberg, K., & Imdahl, C. (2022). Evaluating human behaviour in response to AI recommendations for judgemental forecasting. *European Journal of Operational Research*, 303(3), 1151–1167. <https://doi.org/10.1016/j.ejor.2022.03.017>

- Kitchenham, B., Brereton, O. P., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering – a systematic literature review. *Information and Software Technology, 51*(1), 7–15. <https://doi.org/10.1016/j.infsof.2008.09.009>
- Kong, L., Zheng, G., & Brintrup, A. (2024). A federated machine learning approach for order-level risk prediction in supply chain financing. *International Journal of Production Economics, 268*, Article 109095. <https://doi.org/10.1016/j.ijpe.2023.109095>
- Kumar, A., Shankar, R., & Aljohani, N. R. (2020). A big data driven framework for demand-driven forecasting with effects of marketing-mix variables. *Industrial Marketing Management, 90*, 493–507. <https://doi.org/10.1016/j.indmarman.2019.05.003>
- Loske, D., & Klumpp, M. (2021). Human-AI collaboration in route planning: An empirical efficiency-based analysis in retail logistics. *International Journal of Production Economics, 241*, Article 108236. <https://doi.org/10.1016/j.ijpe.2021.108236>
- Mishra, P., & Sant, T. G. (2021, October, 22–23). Role of artificial intelligence and internet of things in promoting banking and financial services during COVID-19: Pre and post effect. In *Proceedings of the 2021 5th International Conference on Information Systems and Computer Networks (ISCON)* (pp. 1–7). Mathura, India. IEEE. <https://doi.org/10.1109/ISCON52037.2021.9702445>
- Modgil, S., Gupta, S., Stekelorum, R., & Laguir, I. (2022a). AI technologies and their impact on supply chain resilience during COVID-19. *International Journal of Physical Distribution & Logistics Management, 52*(2), 130–149. <https://doi.org/10.1108/IJPDLM-12-2020-0434>
- Modgil, S., Singh, R. K., & Hannibal, C. (2022b). Artificial intelligence for supply chain resilience: Learning from COVID-19. *The International Journal of Logistics Management, 33*(4), 1246–1268. <https://doi.org/10.1108/IJLM-02-2021-0094>
- Olan, F., Liu, S., Suklan, J., Jayawickrama, U., & Arakpogun, E. O. (2022). The role of Artificial Intelligence networks in sustainable supply chain finance for food and drink industry. *International Journal of Production Research, 60*(14), 4418–4433. <https://doi.org/10.1080/00207543.2021.1915510>
- Ortiz-Barríos, M., Arias-Fonseca, S., Ishizaka, A., Barbati, M., Avendaño-Collante, B., & Navarro-Jiménez, E. (2023). Artificial intelligence and discrete-event simulation for capacity management of intensive care units during the COVID-19 pandemic: A case study. *Journal of Business Research, 160*, Article 113806. <https://doi.org/10.1016/j.jbusres.2023.113806>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., McGuinness, L. A., Stewart, L. A., Thomas, J., ... & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372*(71). <https://doi.org/10.1136/bmj.n71>
- Paul, J., & Criado, A. R. (2020). The art of writing literature review: What do we know and what do we need to know?. *International Business Review, 29*(4), Article 101717. <https://doi.org/10.1016/j.ibusrev.2020.101717>
- Purnama, I., Hernanda, A., Rachmadi, R., Nugroho, S., Purnomo, M., Ratna, A., Nurtanio, I., & Rusdiansyah, A. (2023). Intelligent teledermatology system: A case of implementing artificial intelligence-based services in healthcare supply chain. *Operations and Supply Chain Management: An International Journal, 16*(1), 140–151. <https://doi.org/10.31387/oscm0520379>
- Ronchini, A., Guida, M., Moretto, A., & Caniato, F. (2024). The role of artificial intelligence in the supply chain finance innovation process. *Operations Management Research, 17*, 1213–1243. <https://doi.org/10.1007/s12063-024-00492-2>
- Sharma, S., Gupta, N., & Thakur, P. (2024). The lean link: Exploring Industry 4.0's influence on sustainable operational performance for services. *International Journal of Quality & Reliability Management, 41*(7), 1920–1941. <https://doi.org/10.1108/IJQRM-12-2023-0372>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research, 104*, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Teece, D. (2020). Hand in glove: Open innovation and the dynamic capabilities framework. *Strategic Management Review, 1*(2), 233–253. <https://doi.org/10.1561/111.000000010>

- Teece, D. J. (2023). The evolution of the dynamic capabilities framework. In R. Adams, D. Grichnik, A. Pundziene, & Volkman, C. (Eds.), *Artificiality and sustainability in entrepreneurship* (pp. 113–129). Springer. https://doi.org/10.1007/978-3-031-11371-0_6
- Tiwari, M., Bryde, D. J., Stavropoulou, F., Dubey, R., Kumari, S., & Foropon, C. (2024). Modelling supply chain visibility, digital technologies, environmental dynamism and healthcare supply chain resilience: An organisation information processing theory perspective. *Transportation Research Part E: Logistics and Transportation Review*, 188, Article 103613. <https://doi.org/10.1016/j.tre.2024.103613>
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, 14(3), 207–222. <https://doi.org/10.1111/1467-8551.00375>
- Virmani, N., Singh, R. K., Agarwal, V., & Aktas, E. (2024). Artificial intelligence applications for responsive healthcare supply chains: A decision-making framework. *IEEE Transactions on Engineering Management*, 71, 8591–8605. <https://doi.org/10.1109/TEM.2024.3370377>
- Wamba, S. F., Queiroz, M. M., Jabbour, C. J. C., & Shi, C. V. (2023). Are both generative AI and ChatGPT game changers for 21st-century operations and supply chain excellence?. *International Journal of Production Economics*, 265, Article 109015. <https://doi.org/10.1016/j.ijpe.2023.109015>
- Yao, X., Li, X., Mangla, S. K., & Song, M. (2024). Roles of AI: Financing selection for regretful SMEs in e-commerce supply chains. *Transportation Research Part E: Logistics and Transportation Review*, 189, Article 103649. <https://doi.org/10.1016/j.tre.2024.103649>
- Yazdi, M., Mohammadpour, J., Li, H., Huang, H. Z., Zarei, E., Pirbalouti, R. G., & Adumene, S. (2023). Fault tree analysis improvements: A bibliometric analysis and literature review. *Quality and Reliability Engineering International*, 39(5), 1639–1659. <https://doi.org/10.1002/qre.3271>
- Yu, W., Zhao, G., Liu, Q., & Song, Y. (2021). Role of big data analytics capability in developing integrated hospital supply chains and operational flexibility: An organizational information processing theory perspective. *Technological Forecasting and Social Change*, 163, Article 120417. <https://doi.org/10.1016/j.techfore.2020.120417>
- Zheng, G., Kong, L., & Brintrup, A. (2023). Federated machine learning for privacy preserving, collective supply chain risk prediction. *International Journal of Production Research*, 61(23), 8115–8132. <https://doi.org/10.1080/00207543.2022.2164628>
- Zheng, G., Ivanov, D., & Brintrup, A. (2024). An adaptive federated learning system for information sharing in supply chains. *International Journal of Production Research*, 63(11), 3938–8132.
- Zouari, D., Ruel, S., & Viale, L. (2021). Does digitalising the supply chain contribute to its resilience?. *International Journal of Physical Distribution & Logistics Management*, 51(2), 149–180. <https://doi.org/10.1108/IJPDLM-01-2020-0038>
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. <https://doi.org/10.1177/1094428114562629>