LOGIS

Vol. 1, No. 1, May 2025
LOGIS: Logistics, Operations and
Global Integration Studies
https://journal.dinamikapublika.id/index.php/logis

MANAGING RETAIL SUPPLY CHAINS: A LITERATURE-BASED REVIEW ON RISK FACTORS, SUSTAINABLE PRACTICES, AND DIGITAL TRANSFORMATION

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ABSTRACT

This systematic literature review investigates the evolving landscape of Retail Supply Chain Management (RSCM), focusing on the triadic themes of risk, sustainability, and digital integration. Employing the PRISMA framework and VOSviewer for bibliometric analysis, 32 peer-reviewed articles from 2020–2025 were synthesized to uncover prevailing research patterns and thematic gaps. The findings reveal a temporal shift in scholarly focus—from foundational topics such as pricing optimization and channel coordination to emerging areas involving artificial intelligence, blockchain, and green logistics. Thematic analysis highlights persistent definitional ambiguities in RSCM and identifies fragmented treatment of risk, digitalization, and sustainability across the literature. Notably, most studies examine these themes in isolation, overlooking their interdependencies and combined impact on supply chain resilience and strategic alignment. This review proposes that future research should adopt integrative frameworks that simultaneously address technological advancement, environmental accountability, and risk mitigation. It also offers actionable insights for practitioners seeking to build adaptive, transparent, and ethically sustainable supply chains. By bridging thematic silos, this study contributes to a more holistic understanding of RSCM and sets a foundation for theoretical innovation and practical transformation in the retail sector.

Keywords: **Digitalization, Resilience, Supply Chain, Risk Management, Sustainability**

1. INTRODUCTION

Retail Supply Chain Management (RSCM) has emerged as a critical area of focus in both academic research and practical operations, reflecting the growing complexity and dynamism of modern retail environments (Mardhiyah, 2022; Tan, 2022; Winata, 2022). As global markets become increasingly competitive and consumer expectations continue to evolve, retailers are under constant pressure to enhance operational efficiency, ensure seamless customer experiences, and maintain supply chain resilience. RSCM plays a vital role in this equation by integrating various functional areas—procurement, logistics, inventory management, and distribution—into a cohesive framework designed to deliver value across the entire supply chain. The capacity of a retail supply chain to respond efficiently to market fluctuations, technological advancements, and sustainability requirements has become a defining factor in achieving and sustaining competitive advantage (Arma, 2022; Putri, 2022; Setiawan, 2022).

Recent literature has highlighted the transformation of RSCM from a traditionally linear and operationally focused function to a highly interconnected and strategically driven domain. The integration of supply chain and distribution management into broader retail strategy has led to the

formation of cooperative networks that extend beyond intercorporate boundaries, fostering horizontal and vertical linkages that enhance overall supply chain cohesion (Liu & Song, 2024; Zhang et al., 2025). These networks not only enable more effective coordination of resources but also allow for the co-creation of value among retailers, suppliers, and consumers. Holistic supply chain integration is no longer a competitive differentiator but a necessary adaptation to survive in a retail ecosystem marked by volatility, uncertainty, complexity, and ambiguity (VUCA).

Among the most pressing concerns within RSCM is the effective management of risk. The COVID-19 pandemic, global political instability, and supply chain disruptions have all underscored the vulnerability of retail systems to external shocks. Inventory risk, in particular, has become more pronounced as firms grapple with unpredictable demand patterns and constrained supply. Research has shown that the implementation of strategic contracts between supply chain partners, especially between risk-neutral manufacturers and risk-averse retailers, plays a critical role in managing such risks (Chen et al., 2024; Hou & Lu, 2024). These contracts facilitate more balanced risk-sharing mechanisms, which in turn stabilize operations during periods of economic turbulence. Moreover, risk management frameworks are evolving to incorporate predictive analytics, real-time monitoring, and scenario planning to better prepare organizations for future disruptions (Rolando et al., 2022; Rolando & Mulyono, 2025a; Wijaya, 2022).

Concurrently, the digital transformation of retail supply chains is gaining momentum, propelled by the proliferation of technologies such as the Internet of Things (IoT), artificial intelligence (AI), blockchain, and advanced analytics. The shift toward omni-channel retailing—where physical stores, online platforms, and mobile applications are integrated into a unified customer experience—has necessitated the convergence of supply chain and digital strategy. Empirical studies affirm that such digital integration enhances agility, reduces lead times, and enables real-time decision-making (Mahapatra et al., 2025; Zhang et al., 2025). For instance, the synchronization of online and offline operations through shared data infrastructures and cloud-based platforms improves order fulfillment efficiency and customer satisfaction. Digitalization also fosters transparency, which is particularly beneficial in enhancing traceability and accountability across supply chain tiers (Ingriana et al., 2024; Mulyono, 2024; Rolando & Mulyono, 2025b).

Another significant area of evolution in RSCM is the incorporation of sustainability as a core strategic objective. Retailers are increasingly being held accountable for the environmental and social impacts of their operations, leading to a rise in the adoption of green logistics, closed-loop supply chains, and carbon reduction strategies (Mulyono et al., 2025; Rolando, 2024; Rolando & Ingriana, 2024). The pressure from regulatory bodies, investors, and environmentally conscious consumers has driven companies to re-evaluate their supply chain practices through the lens of sustainability (Bhunia et al., 2024; Cao et al., 2024). Several studies emphasize that integrating sustainability into supply chain operations not only reduces environmental harm but also enhances corporate reputation, stakeholder trust, and long-term profitability. Technologies such as blockchain and digital ledgers have been particularly effective in improving sustainability reporting and tracking carbon footprints.

Despite these advances, the existing literature on RSCM remains fragmented, with limited integrative frameworks that address the interplay between risk, sustainability, and digital integration. Most studies tend to examine these domains in isolation, failing to capture the synergistic effects that emerge when they are considered together. For example, while there is substantial work on risk mitigation through contracts or scenario analysis, fewer studies explore how digital tools such as AI or blockchain might simultaneously enhance resilience and support sustainability goals. Similarly, the literature on green supply chains often overlooks the potential for digital solutions to streamline eco-friendly practices. This lack of integration hampers the development of holistic models that reflect the complex realities of modern retail supply chains (Maha et al., 2025; Rahardja et al., 2025; Rolando, Widjaja, et al., 2025).

In response to this gap, this paper conducts a systematic literature review (SLR) to consolidate and critically analyze the current body of knowledge on RSCM, specifically focusing on the triad of risk, sustainability, and digital integration. The aim is to synthesize existing findings, identify knowledge gaps, and propose directions for future research that align with the evolving demands of the retail industry. A systematic approach is particularly suitable for this purpose as it enables comprehensive coverage of the literature while maintaining methodological rigor and transparency. Following the guidelines established by PRISMA framework, this SLR ensures the replicability and reliability of its findings.

The following research questions guide this review:

1. What are the major risks affecting retail supply chains, and how are they mitigated?
2. How is sustainability conceptualized and applied in retail supply chain management?
3. What digital technologies are being integrated into retail supply chains, and what are their impacts?

These questions provide a structured foundation for exploring the ways in which RSCM is evolving in response to environmental, economic, and technological pressures. The review encompasses peer-reviewed journal articles and conference papers published between 2020 and 2025, covering a broad spectrum of disciplines including operations management, logistics, supply chain finance, digital technology, and environmental management. The selection criteria ensure that only high-quality and thematically relevant studies are included in the analysis (Rolando, Chandra, et al., 2025; Widjaja, 2025).

The scope of this review is confined to the retail sector, which includes both brick-and-mortar and online retailers engaged in the direct sale of goods to consumers. While lessons from manufacturing and service supply chains may offer useful analogies, the distinctive nature of retail—characterized by short product life cycles, high consumer expectations, and volatile demand patterns—justifies a sector-specific focus. Moreover, the study targets three thematic pillars: risk, sustainability, and digital integration. Studies that do not address at least one of these themes in the retail context were excluded to maintain thematic consistency and analytical depth.

The significance of this review lies in its potential to advance theoretical understanding and inform managerial practice. By elucidating the interdependencies among risk management, digital transformation, and sustainability, the review provides a conceptual foundation for developing integrated models that reflect the complexity of contemporary retail environments. For practitioners, the findings offer actionable insights into how digital tools can be leveraged to mitigate risks, enhance sustainability, and drive performance improvements. For scholars, the review identifies critical research gaps—such as the lack of multi-dimensional frameworks and the need for longitudinal studies—that warrant further exploration.

This paper is organized as follows. After this introduction, the methodology section outlines the systematic review process, including the search strategy, inclusion and exclusion criteria, data extraction procedures, and quality assessment. The results section presents the key findings of the review, structured around the three core themes. The discussion section interprets these findings in relation to the research questions and highlights emerging trends, gaps, and opportunities for future research. Finally, the conclusion summarizes the study's contributions and proposes recommendations for both academic and practitioner audiences. Through this structured and comprehensive investigation, the review aims to deepen our understanding of the strategic and operational dynamics of retail supply chains, offering a timely contribution to the literature and setting the stage for further innovation in this critical area of research and practice.

2. RESEARCH METHOD

This section outlines the systematic approach employed in this study to identify, screen, and synthesize existing literature on retail supply chain management (RSCM), with a particular focus on

risk, sustainability, and digital integration. Following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, the methodology integrates both qualitative thematic analysis and quantitative bibliometric mapping using VOSviewer software to ensure comprehensiveness and rigor.

2.1 Search Strategy

To obtain a robust and representative sample of academic literature, a structured search was conducted using two widely recognized databases: **Scopus** and **Google Scholar**. These databases were selected due to their comprehensive coverage of peer-reviewed publications across the fields of supply chain management, logistics, digital technology, and sustainability. The search was limited to publications released between **2020 and 2025**, a timeframe chosen to capture both foundational and emerging perspectives within the rapidly evolving domain of RSCM.

A set of targeted search terms was developed to reflect the study's core themes. These included combinations such as *"retail supply chain"*, *"inventory management"*, and *"logistics"* alongside thematic qualifiers like *"risk", "resilience", "disruption"*, *"sustainability"*, *"green logistics"*, *"digitalization"*, *"AI"*, *"blockchain"*, and *"technology integration"*. Boolean operators (AND/OR) were applied across title, abstract, and keyword fields to enhance search precision and scope. A search protocol and log were maintained to record the number of retrieved articles, filters applied, and decisions made at each screening stage to ensure transparency and replicability.

2.2 Inclusion and Exclusion Criteria

To ensure relevance, methodological quality, and thematic alignment, the following criteria were used to guide the selection of articles. Only peer-reviewed journal articles written in English and published between **2020 and 2025** were included. Studies had to focus explicitly on the retail sector and address at least one of the three focal themes—risk management, sustainability, or digital transformation within supply chain contexts. Articles focused solely on manufacturing or service supply chains without retail-specific insights were excluded. Non-research outputs such as editorials, conference abstracts, commentaries, book chapters, and thesis papers were also excluded to maintain academic rigor. While both open access and institutionally accessible publications were considered, inaccessible paywalled content was excluded unless access was granted through institutional databases.

Criteria	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles	Conference papers, book chapters, editorials, theses
Language	English-language publications	Non-English publications
Time Frame	Publications from 2020 to 2025	Articles published before 2020
Accessibility	Open access or accessible via institutional subscriptions	Fully paywalled or inaccessible articles
Subject Area	Business, Management, Supply Chain, Retail, Operations, Technology, Logistics	Articles focused on medicine, engineering, arts, or unrelated sciences
Sector Focus	Studies with specific reference to *retail* supply chains	Studies limited to manufacturing or service supply chains without retail focus
Thematic Relevance	Articles addressing *risk*, *sustainability*, or *digital transformation*	Articles not covering at least one of the core themes
Data Type	Empirical studies, case studies, simulations, or structured conceptual papers	Opinion pieces, commentaries, or non-research-based discussions

Table 1. Inclusion Exclusion and Criteria

2.3 Study Selection Process

The study selection was conducted in several sequential stages in accordance with the PRISMA guidelines. An initial search yielded **5,244 records**. After removing duplicates, titles and abstracts were screened for relevance, resulting in the elimination of non-qualifying articles. The remaining **134 articles** underwent full-text assessment to evaluate alignment with the research themes and quality standards. Following this comprehensive review, a final set of **32 articles** was included in the synthesis.

This process is illustrated through the **PRISMA flow diagram**, which provides a visual summary of identification, screening, eligibility assessment, and final inclusion. The diagram should be inserted below to enhance transparency.

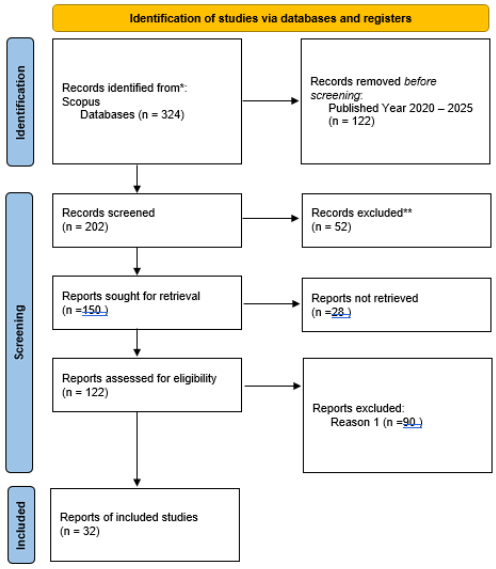

Figure 1. PRISMA SLR: "AI," AND "Retail", AND "Impact"

2.4 Data Extraction

Data from the selected articles were systematically extracted using a structured template developed in Microsoft Excel. Each entry captured bibliographic information (author(s), year, journal), study context (country, retail focus), methodological details (research design, sample size, tools used), theoretical frameworks, and key findings relevant to risk, sustainability, and digitalization. To ensure objectivity, data extraction was conducted independently by two reviewers. Differences in interpretation were reconciled through discussion or third-party adjudication when necessary. This comprehensive dataset enabled both thematic synthesis and bibliometric mapping.

2.5 Quality Assessment

To assess the methodological rigor of the included studies, a customized quality evaluation rubric was applied, drawing on the **Mixed Methods Appraisal Tool (MMAT)** and elements of the **Critical Appraisal Skills Programme (CASP)**. Studies were evaluated on dimensions such as clarity of research design, robustness of sampling, analytical depth, and credibility of conclusions. Each article was assigned a numerical score out of 20, with a minimum threshold of **14** required for inclusion. This ensured that only studies meeting high academic standards were retained. Overall inter-rater reliability during this stage was high, and discrepancies were addressed collaboratively.

2.6 Bibliometric Analysis Using VOSviewer

To complement qualitative synthesis, a bibliometric analysis was conducted using **VOSviewer (version 1.6.18)**. This tool was employed to map and visualize intellectual trends, co-

authorship patterns, thematic clusters, and keyword relationships among the selected studies. Three forms of bibliometric mapping were carried out: (1) **co-citation analysis**, to identify foundational literature; (2) **keyword co-occurrence analysis**, to detect thematic concentrations; and (3) **bibliographic coupling**, to explore intellectual connectivity among studies.

Keywords appearing in at least five distinct articles were retained for analysis, with general terms excluded using a custom thesaurus file. Clustering algorithms based on association strength provided insight into the dominant themes within the literature, while overlay visualizations traced temporal evolution. The bibliometric findings helped validate the relevance of the three core themes and informed the thematic synthesis process.

2.7 Thematic Synthesis

The final stage of analysis involved a structured thematic synthesis based on qualitative coding techniques. A three-phase coding procedure was applied. First, **open coding** was used to generate initial codes directly from the data, capturing recurring patterns and terminology. Next, **axial coding** grouped these codes into broader conceptual categories that aligned with the study's research objectives—for example, "inventory volatility," "blockchain traceability," and "reverse logistics." Finally, **selective coding** was conducted to extract overarching themes and relationships across studies, forming an integrative framework around the triadic dimensions of risk, sustainability, and digital transformation in retail supply chains.

This thematic framework underpins the analysis presented in the results and discussion sections, offering a nuanced understanding of how academic research has addressed the evolving challenges and strategies in modern RSCM.

3. RESULTS AND DISCUSSION

3.1 Bibliometric Analysis Results

3.1.1 Network Visualization

The bibliometric analysis conducted using VOSviewer software offers a structured understanding of the research landscape in retail supply chain management (RSCM). The network visualization of keyword co-occurrences extracted from 32 selected articles reveals three prominent thematic clusters, each highlighting dominant academic foci within the domain. This visualization enables a conceptual mapping of interrelated research themes.

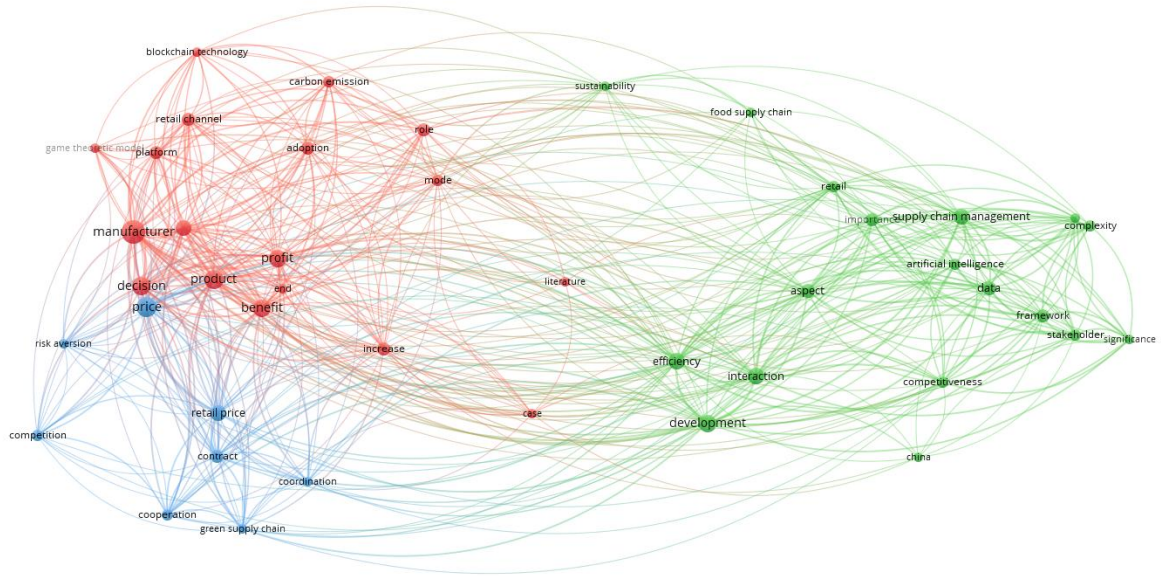

Figure 2. Network Visualization

The first cluster, colored in red, reflects a focus on operational optimization within RSCM. Frequently occurring keywords in this group include "manufacturer," "product," "profit," and "decision." These terms suggest that this cluster comprises literature centered on pricing optimization, profitability models, retailer-manufacturer coordination, and contract design. Studies within this group often use game theory, analytical modeling, and simulations to investigate how pricing and production decisions can be jointly optimized to enhance system-wide performance.

The second cluster, shown in blue, deals with risk management and coordination mechanisms. It features keywords such as "retail price," "contract," "competition," and "risk aversion." This cluster contains literature examining risk-sharing mechanisms, including buy-back and revenue-sharing contracts, especially in scenarios characterized by demand uncertainty or market volatility. Research here addresses how retailers and suppliers negotiate terms that minimize risk exposure and align incentives, thereby promoting supply chain stability.

The third cluster, illustrated in green, highlights a newer strand of research focused on sustainability and digital technologies. Key terms include "supply chain management," "sustainability," "artificial intelligence," "data," and "stakeholder." Articles in this cluster explore how digital tools like blockchain, big data analytics, and AI can be integrated into RSCM to promote transparency, stakeholder engagement, and eco-efficiency. The rise of these topics signifies a shift toward strategic and ethically conscious supply chain operations.

Collectively, the network visualization highlights an intellectual structure where foundational concerns about pricing and contracts are being complemented—and in some cases superseded—by strategic concerns involving sustainability and digital innovation.

3.1.2 Overlay Visualization

To complement the static network map, VOSviewer's overlay visualization adds a temporal layer by illustrating how research focus has evolved over time. In this overlay, older publications are represented by cooler colors (blue/green), while newer studies are shaded in warmer tones (yellow/orange).

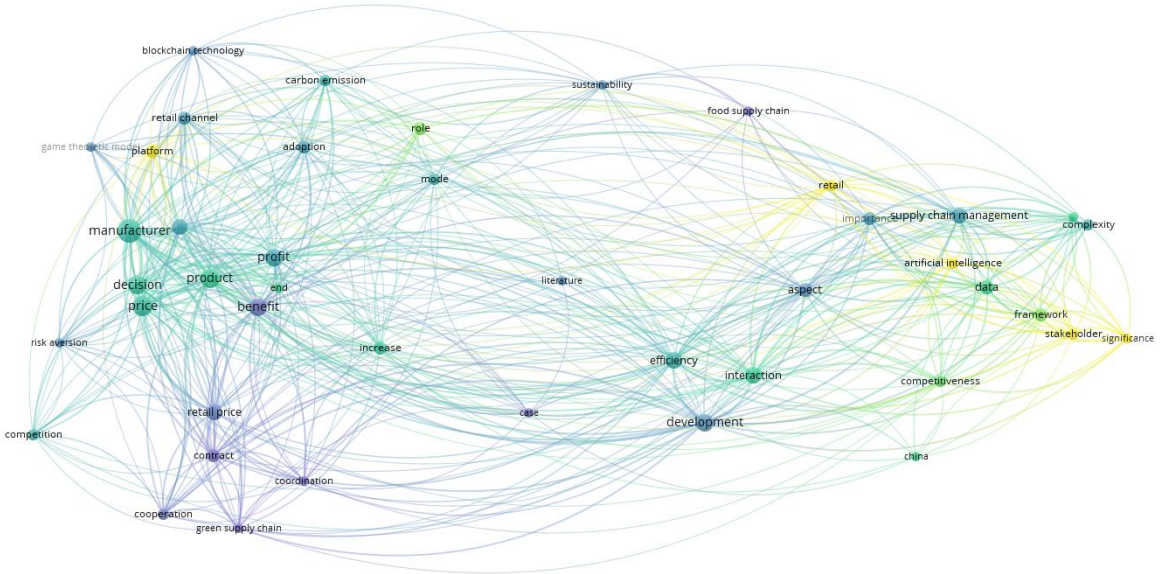

Figure 3. Overlay Visualization

In the earlier phase of the timeline, research emphasized traditional retail operations such as channel coordination, green logistics, and contractual modeling. These studies often utilized formal mathematical models to improve order quantities, minimize holding costs, and align retail margins. This phase is visible in the overlay map through the blue-tinted nodes.

From around 2019 onward, the literature began to transition toward topics involving data-driven decision-making, artificial intelligence, sustainability metrics, and stakeholder collaboration. Keywords like "framework," "digitalization," and "AI" appear with greater frequency and are prominently marked in yellow on the overlay. This indicates a surge in studies focusing on real-time analytics, ethical sourcing, circular economy practices, and the application of emerging technologies to retail logistics. The color gradient across the visualization reflects this research evolution and validates the shifting priorities within the RSCM discipline.

3.2 Synthesis of Literature Themes

3.2.1 Definitional Ambiguity in RSCM

A recurring issue in the literature is the lack of consensus surrounding the scope and definition of retail supply chain management. Scholars often diverge on whether RSCM should be limited to logistics and procurement or include a broader spectrum encompassing customer service, information systems, and strategic coordination across the value chain. Oyedijo et al., (2024) argue that without a standardized definition, theoretical development becomes fragmented and empirical studies become difficult to compare. Similarly,Liu & Song, (2024) highlight that ambiguity around RSCM hampers the formulation of unified models that reflect the integrated nature of modern retail operations, especially in omni-channel and globalized environments.

3.2.2 Risk Management and Resilience

The literature acknowledges that retail supply chains are increasingly vulnerable to diverse disruptions—including natural disasters, pandemics, and geopolitical tensions. Risk management thus emerges as a foundational theme, focusing on the mitigation of uncertainties through contractual alignment, inventory buffers, and real-time visibility tools. Authors like Hou & Lu, (2024) emphasize that resilience must be understood not only as a recovery capability but also as an adaptive process involving system-wide flexibility. Heese, (2025) complements this view by proposing analytical models that capture how minimum order quantities and pricing strategies can be adjusted to enhance post-disruption recovery. Nonetheless, studies that take a holistic view of resilience—incorporating financial, technological, and strategic dimensions—remain limited.

3.2.3 Digital Transformation in Supply Chains

Recent years have witnessed a surge in literature addressing the role of digital technologies in retail supply chains. Core technologies such as artificial intelligence (AI), the Internet of Things (IoT), and blockchain are being applied to optimize inventory decisions, track goods in real time, and enhance end-to-end visibility. Mahapatra et al., (2025) highlight how AI-driven demand forecasting improves retail responsiveness and minimizes stockouts. Zhang et al., |(2025) show that blockchain enables transparent sourcing and traceability, which are crucial for consumer trust in omni-channel environments. These studies suggest that digital transformation is not merely a technological upgrade but a paradigm shift that enables agile and customer-centric supply chain models.

3.2.4 Sustainability as a Strategic Imperative

Environmental sustainability is increasingly viewed as a core driver of competitive advantage in retail. Scholars such as Bhunia et al., (2024) investigate closed-loop logistics and circular economy initiatives, while Cao et al., (2024) explore green procurement and supplier compliance programs. Despite these advances, the literature often isolates sustainability from other themes like digital transformation or risk. For example, while blockchain can improve transparency in sustainability reporting, few studies explicitly link this technology to sustainability outcomes. This thematic isolation reflects a gap in the literature and highlights the need for integrative approaches.

3.2.5 Thematic Gaps and Future Research Directions

One of the most significant gaps identified is the lack of integrative frameworks that simultaneously address risk, sustainability, and digital innovation. Current studies often operate in thematic silos, examining one domain without considering its interactions with others. This is a

missed opportunity, as technological tools can enhance both sustainability and resilience, and sustainable practices can, in turn, reduce certain types of supply chain risks. Furthermore, there is limited empirical research on how these themes intersect in real-world retail environments. Future research should therefore aim to develop comprehensive models that capture these intersections and validate them through case studies, simulations, or field experiments.

3.3 Summary of Findings

In summary, this systematic review reveals a dynamic and increasingly sophisticated research landscape in retail supply chain management. The bibliometric analysis confirms that the field has evolved from focusing primarily on pricing optimization and channel coordination to embracing broader concerns related to risk, sustainability, and digital transformation. Thematic synthesis shows that although each of these domains has been well-explored individually, there is still a pressing need for integrative frameworks that reflect the complex realities of modern retail operations. Future studies must build on these foundations by adopting interdisciplinary approaches and focusing on the synergy between digital tools, sustainable practices, and resilience strategies. Such research will not only close existing gaps but also support practitioners in navigating the rapidly changing landscape of global retail supply chains.

4. CONCLUSION

This systematic literature review has explored the evolving landscape of Retail Supply Chain Management (RSCM), with a specific emphasis on the triadic dimensions of risk, sustainability, and digital integration. Through a rigorous methodology combining bibliometric mapping and qualitative thematic synthesis, this study has brought to light not only the trajectory of scholarly discourse but also critical gaps that remain unaddressed.

The bibliometric analysis, enabled by VOSviewer, revealed a shift in academic priorities over time—from foundational topics like pricing models and supplier coordination to newer domains focused on digital transformation and environmental sustainability. The network visualization underscored the clustering of research around traditional themes, while the overlay visualization highlighted a recent surge in interest toward AI applications, blockchain, and green logistics. These findings reflect broader shifts in industry demands, driven by global disruptions, consumer expectations, and technological innovations.

The thematic synthesis further illuminated how risk management continues to be a cornerstone of RSCM scholarship, particularly in light of post-pandemic instability, demand uncertainty, and supply shocks. Concurrently, the integration of digital technologies—ranging from AI and IoT to cloud-based logistics systems—is reshaping the operational backbone of retail supply chains, enabling real-time responsiveness and agility. Likewise, the growing prioritization of sustainability initiatives, such as closed-loop logistics and transparent sourcing, reflects the retail sector's increasing accountability to social and environmental benchmarks.

Despite the maturity of research in these individual domains, a key conclusion of this review is that the literature remains highly fragmented. Most studies continue to treat risk, sustainability, and digital transformation as discrete themes, lacking a cohesive framework that accounts for their interdependencies. This siloed approach limits the ability of both scholars and practitioners to address the multifaceted challenges that characterize modern retail supply chains.

To bridge this divide, future research should focus on developing integrative frameworks that simultaneously incorporate risk mitigation strategies, sustainability practices, and digital innovations. Longitudinal case studies and empirical investigations across diverse geographic and retail contexts are especially needed to validate such models. Additionally, interdisciplinary collaborations between supply chain management, environmental science, and information systems could foster the development of holistic strategies that are both theoretically grounded and practically relevant.

For practitioners, this review offers several actionable insights. Retailers are encouraged to invest in digital infrastructures that not only improve operational efficiency but also support resilience and environmental transparency. The adoption of smart contracts, predictive analytics, and traceability tools can simultaneously enhance supply chain agility and bolster stakeholder trust. Furthermore, integrating sustainability metrics into supply chain KPIs and decision-making processes can align economic performance with broader societal values.

In sum, this study contributes a consolidated view of RSCM scholarship, while advocating for a unified, cross-thematic approach to navigating its future. By recognizing the interconnectedness of risk, sustainability, and technology, researchers and practitioners alike can better prepare for the complexities of tomorrow's retail environment—an environment that demands agility, accountability, and innovation in equal measure.

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