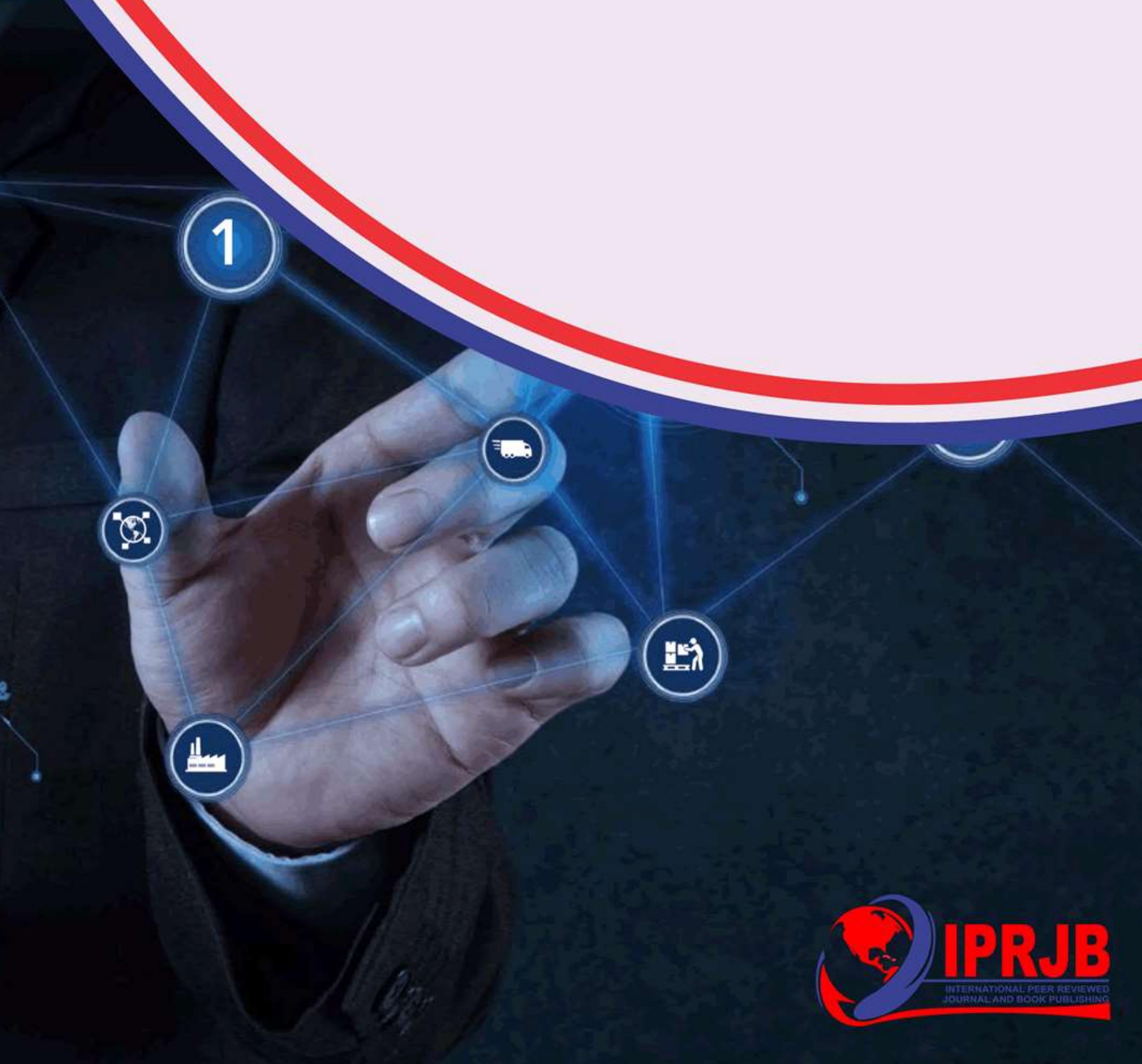
International Journal of
Supply Chain Management
(IJSCM)

Rethinking Global Supply Chain Governance: An Integrated Conceptual Framework for Resilience, Sustainability, and Digital Innovation in an Era of Persistent Disruption

Benjamin Bensam Sambiri, Alina Baskakova, Ahmed Ashraf, Safi Anjum, Peter Ajonghakoh Foabeh, Munawwar Khail and Hani Ahmed Elagamawy



Rethinking Global Supply Chain Governance: An Integrated Conceptual Framework for Resilience, Sustainability, and Digital Innovation in an Era of Persistent Disruption

[1*]Benjamin Bensam Sambiri
Berlin School of Business and Innovation, Berlin, Germany

[2]Alina Baskakova
Berlin School of Business and Innovation, Berlin, Germany

[3]Ahmed Ashraf
Berlin School of Business and Innovation, Berlin, Germany

[4]Safi Anjum
Berlin School of Business and Innovation, Berlin, Germany

[5]Peter Ajonghakoh Foabeh
Berlin School of Business and Innovation, Berlin, Germany

[6]Munawwar Khail
Berlin School of Business and Innovation, Berlin, Germany

[7]Hani Ahmed Elagamawy
Berlin School of Business and Innovation, Berlin, Germany

Article History

Received 10th May 2026
Received in Revised Form 12th June 2026
Accepted 9th July 2026

How to cite in APA format:

Sambiri, B., Baskakova, A., Ashraf, A., Anjum, S., Foabeh, P., Khail, M., & Elagamawy, H. (2026). Rethinking Global Supply Chain Governance: An Integrated Conceptual Framework for Resilience, Sustainability, and Digital Innovation in an Era of Persistent Disruption. *International Journal of Supply Chain Management*, *11*(1), 31–51. https://doi.org/10.47604/ijscm.3861

Abstract

Purpose: This paper develops a unified conceptual framework that bridges ten thematic domains of contemporary supply chain management in response to the fragmentation of existing scholarly frameworks.

Methodology: Drawing on a systematic review of Scopus-indexed scholarship published between 2018 and 2025, the paper employs the Contextual Innovation Performance Model (CIPM), originally developed by Sambiri (2022, 2024), as the theoretical architecture through which interdependencies among domains are examined.

Findings: The analysis reveals that resilience, sustainability, and digital innovation have ceased to operate as separate strategic agendas and have instead converged into a single, indivisible performance imperative.

Unique Contribution to Theory, Practice and Policy: The CIPM Supply Chain Management Framework provides a theoretically grounded and practically actionable integrative architecture for researchers and practitioners, generating four testable research propositions and offering guidance for organisations seeking to build supply chains capable of generating sustained competitive and social value under conditions of persistent uncertainty.

Keywords: *Supply Chain Resilience, Digital Transformation, Sustainability, CIPM, Procurement, Humanitarian Logistics, Circular Economy, Geopolitical Risk, Network Design*

JEL Classification: *L23, F23, Q56, O33, D23*

INTRODUCTION

Few management disciplines have been tested as severely over the past five years as supply chain management. The COVID-19 pandemic did not merely disrupt flows of goods and materials; it revealed, with unusual clarity, the structural fragility embedded in a model of global production that had been optimised for cost efficiency over several decades. Lean inventory philosophies extended offshore supplier networks, and just-in-time delivery systems, each individually rational and collectively dominant, proved acutely vulnerable when simultaneous pressures mounted at multiple points across the network. The pandemic was followed in short succession by escalating geopolitical tensions, persistent semiconductor shortages, a prolonged shipping container crisis, and a series of climate-related extreme weather events, each capable of inflicting significant supply chain damage independently and collectively constituting what many scholars now describe as a new age of compounding systemic risk.

The academic and professional response has been energetic. Publication volumes on topics including supply chain resilience, nearshoring strategies, digital twins, circular logistics, and artificial-intelligence-assisted demand sensing have grown substantially since 2020. Yet a structural weakness remains: the resulting literature is largely siloed. Scholarship addressing geopolitical risk seldom engages meaningfully with sustainability imperatives. Studies examining blockchain-based traceability rarely probe the behavioural and organisational dynamics that determine whether such technologies are adopted at scale. Research on humanitarian logistics continues, with notable exceptions, to occupy a separate intellectual space from mainstream supply chain management inquiry. This fragmentation carries a practical cost that extends well beyond the academy. Supply chain decision-makers seeking guidance are confronted with a rich but partial landscape of frameworks, models, and recommendations that rarely speak to one another and offer no coherent integrative map.

This paper addresses that gap. It develops an integrated conceptual framework spanning ten interconnected domains of contemporary supply chain management and argues that the relationships among these domains are best understood through the Contextual Innovation Performance Model (CIPM), formulated by Sambiri (2022, 2024). The CIPM holds that supply chain performance outcomes emerge from the interaction between contextual conditions, which encompass institutional, technological, and market environments; innovation inputs, comprising strategic choices, digital capabilities, relational architectures, and human competencies; and performance outputs assessed across five dimensions: efficiency, resilience, sustainability, responsiveness, and social equity. Applying this model to the supply chain domain provides a theoretically grounded and practically actionable framework that integrates the diverse currents of contemporary scholarship and furnishes a foundation for both further empirical inquiry and managerial decision-making.

To avoid the risk of the CIPM becoming an unbounded "everything model," it is important to clarify its intended function at the outset: the CIPM is offered here as a dual-purpose framework that is simultaneously analytical, providing a diagnostic lens through which the sources of underperformance in existing supply chains can be identified, and normative, offering prescriptive guidance for the design of future supply chain configurations. The ten domains reviewed in Section 4 are integrated through this dual lens rather than treated as an exhaustive inventory of every conceivable supply chain concern.

The paper is structured as follows. Section 2 presents the problem statement guiding the study. Section 3 establishes the theoretical grounding of the CIPM and its applicability to supply chain management. Section 4 provides a domain-by-domain review of the literature. Section 5 integrates these domains into the CIPM Supply Chain Management Framework. Section 6 discusses the implications of this integration for theory and practice. Section 7 presents a research agenda, and Section 8 concludes.

Problem Statement

The governance of global supply chains has entered a period of profound reconsideration driven by a succession of compounding disruptions. Despite the volume and quality of scholarly output generated in response to these disruptions, a persistent and consequential structural gap remains in the literature: existing frameworks tend to address individual domains of supply chain management in isolation, producing bodies of work that are rich in disciplinary depth but limited in integrative coherence. Scholarship addressing geopolitical risk rarely engages with sustainability imperatives; research on digital transformation seldom interrogates the behavioural and human capital dimensions that determine whether new technologies are adopted at scale; and humanitarian logistics scholarship continues to occupy a largely separate intellectual space from mainstream commercial supply chain inquiry.

This fragmentation is not merely an academic inconvenience. It generates a practical information deficit for supply chain decision-makers who operate in an environment where resilience, sustainability, and digital transformation challenges are simultaneously and interdependently present. The absence of an integrative framework leaves practitioners without a coherent conceptual map for navigating these pressures and researchers without a unifying architecture through which cross-domain relationships can be examined and cumulative knowledge can be built.

This fragmentation carries a theoretical cost that is distinct from, and arguably more consequential than, its practical counterpart: in the absence of a shared integrative architecture, individual studies cannot build cumulatively on one another, since findings generated within one domain-specific silo have no established mechanism for informing or being tested against findings generated within another. The result is a literature that continues to expand in volume without a corresponding expansion in explanatory coherence.

This paper addresses these gaps by developing an integrated conceptual framework grounded in the Contextual Innovation Performance Model (CIPM), which bridges ten thematic domains of contemporary supply chain management within a single theoretically coherent architecture. The primary beneficiaries of this research include supply chain scholars seeking a foundation for cross-domain empirical inquiry, senior supply chain practitioners and operations directors seeking integrative strategic guidance, procurement and logistics managers operating at the intersection of sustainability and digital transformation mandates, and policymakers designing regulatory frameworks for supply chain sustainability and resilience at the national and supranational levels.

Theoretical Foundation: The Contextual Innovation Performance Model

The Contextual Innovation Performance Model was constructed in direct response to what Sambiri (2022) identified as a persistent and consequential deficiency in management research: the treatment of performance as a straightforward function of measurable inputs and outputs, with insufficient attention to the contextual conditions that mediate and shape the relationship between them. The CIPM draws its conceptual foundations from three theoretical traditions. From institutional theory (DiMaggio & Powell, 1983), it takes the insight that organisations operate within normative, regulatory, and cognitive environments that powerfully constrain and enable strategic choices. From dynamic capabilities theory (Teece et al., 1997), it borrows the understanding that sustained performance advantage derives not from the possession of particular resources but from the capacity to sense, seize, and reconfigure those resources in response to changing environmental conditions. From complexity theory (Stacey, 2010), it adopts the recognition that organisational systems are characterised by non-linear dynamics, emergent properties, and irreducible uncertainty that render deterministic optimisation models inadequate as tools for strategic guidance.

This complexity-theoretic foundation has a direct methodological implication that Sections 5 and 6 develop further: because supply chain systems are subject to irreducible uncertainty, the CIPM does not seek to specify a single optimal configuration toward which managers should converge. Instead, it advocates flexibility and adaptive capacity over rigid optimisation, treating the capacity to sense and respond to changing contextual conditions as itself a source of competitive advantage rather than a deviation from an otherwise achievable optimum.

Within the CIPM, Context encompasses both external and internal environmental conditions. External contextual factors include regulatory frameworks, geopolitical conditions, market structures, competitive dynamics, and the state of technological infrastructure. Internal contextual factors include leadership orientation, organisational culture, resource endowments, and the competency profile of the workforce. Innovation is understood in a broad and inclusive sense that extends well beyond product and process innovation to encompass relational innovation in supplier and customer networks, institutional innovation in governance arrangements and procurement design, and digital innovation through the adoption and integration of transformative technologies. Performance is evaluated across the five dimensions noted above, with no single dimension accorded primacy. This multi-dimensional orientation reflects the recognition that supply chain excellence in the contemporary era requires simultaneous progress across all five areas rather than the maximisation of any one at the expense of the others.

The CIPM is particularly well suited to supply chain management because supply chains are among the most context-sensitive organisational systems encountered in practice. A network design that delivers optimal performance in a stable, low-disruption environment may prove catastrophically fragile in a geopolitically volatile one. A digital transformation programme that generates competitive advantage in a high-infrastructure economy may be entirely unsuitable for the resource-constrained environments in which humanitarian logistics operations are conducted. The CIPM accommodates these contingencies by insisting that no universal best practice exists independent of context and that performance improvement requires an iterative process of context-sensitive alignment between strategic choices, capability investments, and environmental realities.

Table 1 provides a preliminary mapping of the ten supply chain domains reviewed in this paper to the CIPM's tripartite structure, offering a visual representation of the integrative logic that Section 5 develops in full.

The mappings presented in Table 1 should be read as indicating each domain's primary point of theoretical entry into the CIPM rather than an exclusive or mutually incompatible categorisation. Behavioural and Human Factors, for example, is mapped principally to the Context layer because organisational culture and workforce competency profiles constitute part of the internal environment within which strategic choices are made; the same domain simultaneously operates as an Innovation-layer driver, since training investment and culture-change initiatives are themselves innovation choices available to managers. Several of the domain-to-component mappings in Table 1 exhibit this same dual character, and the table should be interpreted accordingly.

Table 1: Mapping of Supply Chain Domains to CIPM Components

Supply Chain Domain	Primary CIPM Component	Performance Dimension
Strategy and Network Design	Context and Innovation	Efficiency and Resilience
Risk and Resilience	Context	Resilience and Responsiveness
Sustainability and Circular Economy	Innovation	Sustainability and Social Equity
Digital Transformation	Innovation	Efficiency and Responsiveness
Inventory and Operations	Innovation	Efficiency
Transportation and Logistics	Context and Innovation	Efficiency and Sustainability
Procurement and Sourcing	Innovation	Efficiency and Social Equity
Behavioural and Human Factors	Context	Resilience and Responsiveness
Humanitarian and Healthcare Logistics	Context and Performance	Social Equity and Resilience
Quantitative and Methodological Advances	Innovation	Efficiency and Responsiveness

LITERATURE REVIEW

Methodology of the Systematic Review

This paper employs a systematic conceptual review methodology designed to synthesise scholarly knowledge across ten thematic domains of supply chain management. The review was conducted through a structured search of the Scopus database, which was selected on the basis of its comprehensive coverage of peer-reviewed management, operations research, and logistics journals. The search was bounded by a publication window of 2018 to 2025, with the lower limit chosen to capture scholarship produced in the period immediately preceding and following the major supply chain disruptions associated with the COVID-19 pandemic. Search terms were constructed for each of the ten domains using a combination of field-specific keywords including supply chain resilience, digital twin, blockchain traceability, circular economy, humanitarian logistics, omnichannel fulfilment, nearshoring, geopolitical risk, and behavioural operations management. Results were screened on the basis of relevance to the domain under review, methodological quality, citation impact, and contribution to theoretical development. Grey literature, conference proceedings, and non-English language publications were excluded to ensure consistency of quality assessment. Foundational theoretical works predating the 2018 boundary were retained where they established conceptual frameworks that continue to inform contemporary scholarship. The synthesis process involved thematic analysis of the included literature within each domain, followed by a cross-domain integration step guided by the structure of the CIPM. The research gaps identified in each domain informed the development of the research propositions presented in Section 7.

The exclusion of grey literature, including industry reports produced by consultancies such as McKinsey, Gartner, and the World Economic Forum, represents a deliberate methodological choice rather than an oversight, adopted to maintain consistency of peer-review quality across the reviewed evidence base. This choice carries an acknowledged limitation, however: given the pace at which supply chain practice evolves, industry reporting frequently identifies emerging patterns before they are captured in peer-reviewed academic scholarship, and the review presented here may therefore lag slightly behind the most current frontier of practitioner experience. This limitation is acknowledged rather than resolved within the scope of the present conceptual review.

Supply Chain Strategy and Network Design

The question of how to design and configure global supply chain networks has been revisited with renewed intensity since 2020. The dominant pre-pandemic paradigm, which prioritised geographic concentration, single sourcing, and minimum inventory as the foundations of cost-competitive supply chain design, was exposed as structurally fragile by the cascade of disruptions that followed the pandemic's onset. Simchi-Levi et al. (2020) argued that the pandemic drew into sharp relief a distinction that supply chain scholarship had long acknowledged but that managerial practice had systematically underweighted: the distinction between efficiency and resilience in network design. Their analysis demonstrated that the two objectives frequently require divergent network architectures and that the pursuit of efficiency without commensurate investment in resilience leaves supply chains exposed to failure modes that conventional risk management frameworks are poorly equipped to anticipate or manage.

Ivanov (2021) advanced this discussion by introducing the concept of supply chain viability, which he distinguished from both robustness and resilience. A viable supply chain, in Ivanov's formulation, is one designed not merely to recover from disruptions but to sustain structural change over extended periods while continuing to fulfil its core purpose. This conceptual development has significant implications for network design, suggesting that the relevant optimisation objective is not recovery speed but long-run adaptive capacity. The growing policy and business interest in nearshoring, reshoring, and friend-shoring reflects precisely this logic: by concentrating supply network activity within geographically proximate or politically aligned regions, firms seek to trade some degree of cost efficiency for enhanced strategic control and reduced exposure to distant geopolitical risk. Kinkel (2022) documented the acceleration of manufacturing relocation decisions among European firms during the pandemic period, identifying proximity to end markets, geopolitical risk reduction, and lead time compression as the three most consistently cited drivers.

Multi-tier supplier relationship management has attracted particular scholarly attention as a dimension of network design that conventional governance approaches leave systematically underaddressed. Choi and Linton (2011) were among the first to highlight the strategic risks arising from sub-tier suppliers that lie outside a focal firm's direct visibility and contractual reach, and subsequent empirical research by Villena and Gioia (2020) confirmed that disruptions originating at the second and third tiers of supply networks account for a disproportionate share of performance failures at the focal firm level. The CIPM frames this as a fundamentally contextual problem: the feasibility and appropriate form of multi-tier governance depends on the institutional environment, including regulatory requirements, industry norms, and available technology platforms, conditions that vary substantially across sectors and geographies.

Research Gap: Multi-tier network governance research remains fragmented across regulatory and institutional contexts; few studies empirically test how contextual variation in institutional environments shapes the optimal balance between efficiency and resilience in network design, leaving practitioners without contingency-based guidance for their specific operating context.

Risk and Resilience Management

Supply chain risk and resilience have become among the most intensively researched topics in the management literature over the past five years, and the theoretical frameworks available to scholars and practitioners have developed considerably in sophistication and scope. The foundational definition offered by Ponomarov and Holcomb (2009), which conceived of supply chain resilience as the adaptive capability to prepare for unexpected events, respond to disruptions, and recover from them while maintaining continuity of operations at the desired level of output, established a productive conceptual platform that has been extensively refined and extended. The most significant subsequent development has been the recognition that some disruptions are not temporary shocks from which recovery is possible but enduring structural changes that require fundamental network redesign rather than recovery planning.

It is useful at this point to distinguish two broad logics of resilience that this literature encompasses. Efficiency-based resilience relies on buffering mechanisms such as safety stock, supplier redundancy at the margin, and contractual penalty clauses, and represents an incremental extension of traditional risk management practice. Structural resilience, by contrast, involves the fundamental reconfiguration of network architecture itself, through multi-sourcing, nearshoring, or regionalised production footprints, and represents a genuine strategic departure from cost-optimised network design rather than an adjustment at its margins. The shift documented across this literature since 2020 is substantially a shift from the former logic toward the latter.

Hohenstein et al. (2015) proposed a multi-phase resilience framework that distinguished among readiness, response, recovery, and growth phases, providing a more granular architecture for resilience programme design than earlier single-phase models. The concept of ripple effects, introduced by Ivanov and Dolgui (2021), further enriched this landscape by describing the mechanisms through which disruptions at one supply chain node propagate through connected nodes in ways that are often non-linear, temporally extended, and difficult to anticipate using conventional probabilistic risk models. Their work provided important theoretical motivation for the development of simulation-based and data-driven approaches to resilience planning, both of which are discussed further in Section 4.11.

Geopolitical risk has emerged as a category of particular salience in the post-pandemic supply chain literature. Sheffi (2020) argued persuasively that trade policy uncertainty, manifested through tariff regimes, export controls, sanctions, and technology transfer restrictions, represents a qualitatively distinctive type of supply chain risk. Unlike weather events or equipment failures, geopolitical risks are not randomly distributed across the network but are concentrated in specific bilateral trade relationships, rendering portfolio diversification an insufficient response. Business continuity planning models have been substantially revised in light of this insight, with scenario-based planning approaches that incorporate geopolitical volatility as a first-order variable increasingly displacing the residual-risk treatment of geopolitical exposure that characterised earlier frameworks (Alicke et al., 2022).

Research Gap: Resilience scholarship and geopolitical risk scholarship have developed along largely parallel tracks; the interaction between contextual geopolitical volatility and node-level ripple effect propagation has not been integrated into a single, empirically testable model of network-level resilience investment.

Sustainability and Circular Economy

The relationship between supply chain management and environmental and social sustainability has undergone a fundamental transformation over the past decade. What was once treated as a peripheral corporate responsibility consideration has become a strategic imperative of the first order, driven by regulatory pressure, investor expectations, consumer sentiment, and the growing recognition that climate-related physical risks pose direct threats to supply chain operational continuity. Seuring and Muller (2008) produced an influential early review of the sustainable supply chain management literature that identified environmental and social performance as the two primary dimensions of concern, and the subsequent decade saw considerable growth in research on green logistics, including the optimisation of transportation routes to reduce carbon emissions, the redesign of packaging to minimise material waste, and the integration of renewable energy sources into warehousing and distribution infrastructure.

The circular economy paradigm introduced a more transformative logic to this agenda. The Ellen MacArthur Foundation (2013) articulated the foundational principle of circularity as the design of supply chains to keep products and materials in productive use for as long as possible, recovering and regenerating value at the end of each use cycle rather than disposing of it. Govindan and Soleimani (2017) conducted an extensive review of the reverse logistics literature within this framework, finding that while the mathematical modelling of reverse material flows had achieved considerable sophistication, empirical research on the organisational and institutional conditions required for effective circular economy implementation remained underdeveloped. This gap is precisely the kind that the CIPM is designed to address: circular design innovation cannot be assessed independently of the contextual conditions, including regulatory incentives, consumer behaviour, and supplier capabilities, that enable or constrain its implementation at scale.

This institutional-conditions argument, namely that the feasibility and form of circularity are context-dependent rather than universally specifiable, is the central and most original contribution of this section, and it distinguishes the CIPM (the Contextual Innovation Performance Model introduced in Section 3) from circular economy frameworks that treat implementation barriers as uniform across settings.

ESG integration in procurement and sourcing has gained particular regulatory salience in the European context, where the Corporate Sustainability Reporting Directive and the proposed EU Supply Chain Due Diligence Act are creating binding obligations for large firms to map, assess, and manage environmental and human rights risks across their supplier networks. Sustainable last-mile delivery has meanwhile been reconceived from a narrow urban logistics optimisation problem to a sustainability challenge with far-reaching implications, given that last-mile operations account for a disproportionate share of urban freight emissions and that the sustained growth of e-commerce has intensified these pressures substantially (Allen et al., 2018).

Research Gap: Sustainability and circular economy research rarely examines how environmental and social outcomes interact with resilience or digital enablement; the joint optimisation of sustainability, resilience, and efficiency objectives within a single supply chain design remains theoretically underdeveloped and empirically untested.

Digital Transformation and Technology

The digitalisation of supply chain operations has accelerated markedly since 2018, driven by concurrent advances in artificial intelligence, the Internet of Things, distributed ledger technology, and high-fidelity simulation tools. In the domain of demand forecasting, machine learning approaches have demonstrated a consistent capacity to outperform conventional statistical methods by processing larger and more heterogeneous data sets that incorporate social media signals, satellite imagery, macroeconomic indicators, weather patterns, and point-of-sale transactions (Carbonneau et al., 2008; Spiliotis et al., 2022). The practical value of improved forecast accuracy is substantial, translating directly into reductions in safety stock requirements, fewer stockout events, and closer alignment between production schedules and actual market demand.

Blockchain technology has attracted extensive scholarly attention as a potential mechanism for enhancing supply chain transparency and traceability. Saberi et al. (2019) provided a systematic review of blockchain applications in supply chain management that identified the technology's core value proposition as the creation of immutable, distributed records of transactions and product provenance that can reduce fraud, strengthen regulatory compliance, and enhance consumer confidence. Their review also identified significant barriers to adoption, including high implementation costs, limited interoperability among blockchain platforms, and the practical difficulty of onboarding smaller and less technologically sophisticated supply chain partners. These barriers are fundamentally behavioural and organisational in character rather than technical, and their resolution requires attention to governance design and relational trust that technology alone cannot provide.

Digital twin technology, which creates virtual representations of physical supply chain assets and network configurations that can be used for real-time monitoring, simulation, and scenario analysis, has emerged as one of the most consequential recent innovations in supply chain management practice. Tao et al. (2019) described the engineering foundations of digital twin applications in manufacturing contexts, and subsequent work has extended this logic to supply chain networks, demonstrating that digital twins can substantially reduce the time and cost required to evaluate alternative configurations and to rehearse disruption response strategies before physical implementation (Ivanov, 2021). Internet of Things connectivity, combining sensor arrays, GPS tracking, RFID technology, and cloud-based logistics platforms, provides the real-time data feeds that keep digital twin models synchronised with physical reality, enabling a degree of operational visibility and responsiveness that was practically unattainable a decade ago.

These digital capabilities are not environmentally costless, however, and a rigorous treatment of the convergence between digital transformation and sustainability must confront what has been termed the Green-Digital Paradox: the same sensors, servers, data centres, and battery-dependent infrastructure that enable improved forecasting, traceability, and network visibility carry a substantial embodied and operational environmental footprint of their own, including significant electricity consumption, rare-earth mineral extraction, and end-of-life electronic waste. A supply chain digitalisation programme that reduces operational emissions while simultaneously expanding an environmentally costly technology footprint has not necessarily improved its net environmental performance. The CIPM addresses this tension by requiring that digital innovation choices be evaluated against the Performance layer's sustainability dimension on a net-impact basis, incorporating the environmental cost of the enabling technology itself rather than crediting only the downstream operational efficiencies it produces.

International Journal of Supply Chain Management
ISSN 2518-4709 (Online)
Vol.11, Issue 1, No.3, pp 31 - 51, 2026

Research Gap: Digital transformation research continues to privilege technical feasibility over organisational and behavioural adoption dynamics; despite growing recognition that adoption barriers are frequently human rather than technological, few studies connect digital transformation outcomes explicitly to the behavioural and human-capital factors examined in Section 4.9.

Inventory and Operations Management

Inventory management under conditions of demand and supply uncertainty has been a central concern of operations research since its emergence as a discipline, but the disruptions of the post-pandemic period have brought a new urgency and a new set of empirical realities to this longstanding challenge. The bullwhip effect, first formally characterised by Lee et al. (1997), which describes the progressive amplification of small demand fluctuations as orders move upstream through the supply chain, was observed on an unprecedented scale during the pandemic, as demand signals were simultaneously distorted by panic purchasing, hoarding behaviour, and the sudden collapse of entire consumption categories. Dynamic inventory optimisation models capable of adapting in real time to rapidly shifting demand distributions and supply availability have consequently attracted renewed theoretical and empirical interest.

Omnichannel fulfilment has introduced a new layer of operational complexity arising from the convergence of physical retail and electronic commerce channels. Hubner et al. (2016) reviewed the operations management implications of omnichannel retailing in depth, identifying inventory positioning, order routing logic, and returns management as the three areas where conventional single-channel approaches prove most inadequate. The proliferation of fulfilment options, including buy online and collect in store, ship from store, and same-day home delivery, demands both sophisticated inventory management information systems and substantial organisational coordination across functions and channel partners that have historically operated with considerable autonomy.

This operational complexity is compounded by a trade-off that the omnichannel literature has been slow to confront directly: the service-level expectations associated with same-day and rapid home delivery frequently conflict with sustainability and emissions-reduction targets, since faster fulfilment windows typically require less consolidated, more frequent, and more carbon-intensive transportation movements. Reconciling omnichannel service-level commitments with sustainability performance therefore represents an unresolved tension rather than a solved design problem, one that the CIPM frames as a Performance-layer trade-off requiring explicit contextual negotiation rather than an assumption that both objectives can be maximised simultaneously without cost.

Lean and agile supply chain methodologies continue to provide important conceptual reference points for operations management, though their application has grown more nuanced as the tension between efficiency and resilience has become more widely appreciated. Christopher and Towill (2001) introduced the concept of the leagile supply chain, which combines lean principles in upstream, demand-stable portions of the network with agile principles in downstream, demand-variable portions, offering a more contextually sensitive approach to methodology selection than the choice between pure lean and pure agile would permit.

Research Gap: Dynamic inventory and omnichannel operations models remain predominantly single-objective, optimising for cost or service level in isolation; multi-dimensional performance frameworks capable of incorporating resilience and sustainability constraints alongside traditional operational metrics are largely absent from this literature.

International Journal of Supply Chain Management
ISSN 2518-4709 (Online)
Vol.11, Issue 1, No.3, pp 31 - 51, 2026

Transportation and Logistics Networks

Urban logistics and last-mile delivery optimisation have become two of the most actively researched topics in the supply chain literature, driven by the convergent pressures of sustained e-commerce growth and the tightening of urban sustainability policy in major cities across Europe, North America, and Asia. Savelsbergh and Van Woensel (2016) provided a comprehensive review of the city logistics research landscape, identifying traffic congestion, carbon emissions, noise pollution, and the coordination difficulties arising from multiple competing delivery operators as the primary challenge areas. Subsequent research has examined the potential of urban consolidation centres, cargo bicycle fleets, and micro-fulfilment hubs positioned within urban neighbourhoods to reduce the environmental footprint of last-mile delivery while maintaining commercially viable service levels.

Intermodal freight and port efficiency attracted heightened scholarly and practitioner attention in the aftermath of the global shipping disruptions of 2020 to 2022, during which the simultaneous congestion of major ports including Los Angeles, Rotterdam, and Shanghai created cascading delays that propagated across global supply networks. Research in this area has examined the role of digitalisation in improving container tracking, berth scheduling, and customs clearance efficiency, as well as the resilience implications of greater intermodal flexibility in freight routing. Fleet management and route optimisation have benefited substantially from advances in real-time data analytics, machine learning, and telematics, enabling dynamic routing decisions that accommodate live traffic conditions, fuel price fluctuations, delivery time windows, and driver availability simultaneously.

Research Gap: Transportation and logistics network design research tends to treat environmental performance and disruption resilience as separate optimisation objectives; models that jointly incorporate both criteria within a single network design methodology remain rare.

Procurement and Sourcing

Strategic sourcing and supplier selection have been transformed over the past decade by the integration of multi-criteria decision analysis methodologies, machine learning assisted supplier evaluation tools, and a substantially more explicit recognition of non-cost performance dimensions including sustainability credentials, supply risk exposure, and ethical compliance. The canonical three-criterion supplier selection framework of price, quality, and delivery performance attributed to Dickson (1966) has been progressively enriched to encompass dozens of additional evaluation dimensions, reflecting the growing complexity of the performance expectations placed on supply chain partners. The theoretical challenge of contract design under conditions of information asymmetry has been addressed through principal-agent theory frameworks and through the design of incentive-compatible contractual mechanisms that encourage truthful information revelation (Bolton & Dewatripont, 2005).

Humanitarian and public sector procurement present a set of challenges sufficiently distinctive to have motivated a dedicated and growing body of specialist literature. Humanitarian procurement operates under conditions of extreme time pressure: decisions that in commercial contexts would involve weeks of structured supplier evaluation frequently must be made within hours or days, under conditions of incomplete information and intense public scrutiny. Tomasini and Van Wassenhove (2009) examined the logistics and procurement challenges of major humanitarian organisations in depth and identified three institutional mechanisms as the primary drivers of improved procurement responsiveness: pre-positioned supply inventories, framework agreements with pre-approved suppliers, and structured coordination protocols among agencies operating in the same response environment.

Research Gap: Commercial procurement and humanitarian procurement scholarship remain largely siloed from one another, with limited cross-pollination of contractual and relational governance mechanisms that could benefit both domains, despite the operational parallels evident in disruption-driven sourcing decisions.

Behavioural and Human Factors

The behavioural dimensions of supply chain decision-making have received growing and overdue scholarly attention over the past decade, as researchers have recognised that the quality of supply chain outcomes depends heavily on the cognitive, motivational, and organisational processes through which strategic and operational decisions are made, and not merely on the technical and structural features of the supply chain configurations within which those decisions occur. Kahneman's (2011) work on the systematic nature of cognitive bias in human judgement provided a foundational reference point for supply chain behavioural research, and subsequent scholarship has documented the operation of specific biases in supply chain contexts: overconfidence in demand forecast accuracy, anchoring on historical inventory levels in the face of changed demand conditions, and the escalation of commitment to failing supplier relationships. Bendoly et al. (2006) reviewed the behavioural operations management literature comprehensively and identified a range of experimental and empirical findings that challenge the rational-actor assumptions embedded in classical supply chain optimisation models.

Talent management and skills gaps represent a binding constraint on the pace and quality of supply chain transformation across the sector. The World Economic Forum (2020) identified supply chain and logistics as among the business functions most exposed to skills disruption from automation and digitalisation, and subsequent research has confirmed the difficulty that organisations face in recruiting and retaining professionals who combine the analytical, technological, and relational competencies that contemporary supply chain roles increasingly require. Organisational learning and the effective transfer of knowledge across the supply chain network are critical mechanisms through which the adaptive capabilities that the CIPM identifies as prerequisites for sustained performance are built and maintained over time.

Research Gap: Behavioural supply chain research has not been systematically connected to technology adoption or resilience investment decision-making, despite the CIPM's core proposition that innovation inputs, including human competencies, mediate performance outcomes; this disconnect limits the practical actionability of behavioural findings.

Humanitarian and Healthcare Logistics

Humanitarian logistics has matured into a well-defined field of scholarly inquiry with dedicated journals, active professional communities, and a growing methodological repertoire. The distinctive challenge at the heart of humanitarian supply chain management is the combination of extreme demand uncertainty, severely compressed decision timeframes, resource scarcity, and the operational involvement of multiple organisations with different mandates, accountability structures, incentive systems, and operational protocols. Balcik et al. (2010) examined the coordination mechanisms available to humanitarian organisations in depth and found that information sharing agreements, joint pre-deployment planning processes, and lead agency governance structures all contributed to improved operational performance, though the effectiveness of each mechanism was contingent on the willingness of participating organisations to subordinate institutional interests to the collective efficiency of the response operation.

Pharmaceutical and medical device supply chains attracted heightened research attention following the COVID-19 pandemic, which exposed severe vulnerabilities in the global medical supply network. The high geographic concentration of active pharmaceutical ingredient production in a small number of locations, principally China and India, created critical bottlenecks when global demand for respiratory equipment, diagnostic materials, and protective clothing surged simultaneously across all major markets. Vaccine distribution network modelling has since generated a substantial and methodologically innovative literature, combining facility location optimisation, vehicle routing algorithms, and inventory positioning models with contextual analysis of the institutional, infrastructural, and logistical conditions prevailing in specific national and regional settings. The practical difficulties of maintaining cold chain integrity for mRNA vaccines in low-income, infrastructure-limited environments illustrated the extent to which supply chain models developed in high-income country contexts require substantial adaptation before they can be applied effectively in resource-constrained humanitarian settings, an adaptation challenge that the CIPM is well positioned to guide (Sambiri, 2024).

Research Gap: Humanitarian and healthcare logistics scholarship continues to develop largely independently of mainstream commercial supply chain theory, despite clear operational parallels in disruption response; limited cross-domain theoretical transfer constrains the field's cumulative development.

Quantitative and Methodological Advances

The methodological repertoire of supply chain management research has expanded considerably over the past decade, with operations research and mathematical programming models retaining their central position while being increasingly complemented by simulation-based, machine learning, and data-driven approaches that bring new analytical capabilities to problems that classical methods handle less effectively. Mixed-integer linear programming models continue to provide the foundation for supply chain network design optimisation, enabling researchers and practitioners to identify cost-minimising or resilience-maximising network configurations subject to realistic operational, capacity, and regulatory constraints. Simulation-based modelling, including agent-based simulation and discrete event simulation, has proven particularly valuable for studying the dynamics of disruption propagation and multi-actor response, where the non-linear interactions among supply chain participants render closed-form analytical solutions computationally intractable.

Machine learning has been applied to an expanding portfolio of supply chain analytics challenges, encompassing demand forecasting, supplier risk scoring, delivery time estimation, anomaly detection in logistics data streams, and the identification of compliance violations in procurement activity records. Data-driven decision support systems that integrate machine learning predictions with optimisation models are increasingly being incorporated into commercial supply chain management software platforms, creating productive new opportunities for research that bridges the academic and practitioner communities and that evaluates system performance in live operational settings.

Research Gap: Methodological advances in forecasting and analytics have outpaced their integration into strategic-level decision frameworks; few studies connect granular data-driven techniques to the higher-order constructs of context, innovation input, and multi-dimensional performance that strategic decision-making requires.

International Journal of Supply Chain Management
ISSN 2518-4709 (Online)
Vol.11, Issue 1, No.3, pp 31 - 51, 2026

The CIPM Supply Chain Management Framework: An Integrated Architecture

The literature reviewed in Section 4 presents a picture of a field that is intellectually rich and methodologically diverse but structurally fragmented. Each of the ten domains reviewed has generated important and actionable insights. What the field lacks is a conceptual architecture through which these insights can be brought into productive dialogue with one another and through which the systemic character of contemporary supply chain management challenges can be adequately represented. This section develops such an architecture by applying the Contextual Innovation Performance Model to supply chain management in a systematic and comprehensive manner.

The CIPM Supply Chain Management Framework organises the ten domains reviewed above within its tripartite structure of Context, Innovation, and Performance. The outer layer of the framework, Context, encompasses the geopolitical, regulatory, technological, ecological, and market conditions that define the opportunity set and constraint set within which supply chain managers operate. Network design choices, resilience requirements, and the feasibility of digital transformation initiatives are all shaped by contextual conditions in ways that render context-independent prescriptions unreliable as guides for practice. The middle layer, Innovation, encompasses the strategic, operational, technological, and relational choices through which organisations respond to and, in some cases, reshape their contextual conditions. Supply chain network reconfiguration, circular economy adoption, blockchain implementation, omnichannel fulfilment design, and strategic sourcing model development are all forms of innovation in the CIPM's broad sense. The inner layer, Performance, represents the outcomes generated by the interaction between contextual conditions and innovation choices, assessed across the five dimensions of efficiency, resilience, sustainability, responsiveness, and social equity.

Figure 1 presents a conceptual diagram of the CIPM Supply Chain Management Framework, illustrating the three concentric layers and the ten supply chain domains positioned within them. The outer ring represents the Context layer, encompassing the geopolitical, regulatory, market, and technological environments that shape what is possible. The middle ring represents the Innovation layer, comprising the ten domain-specific strategic and operational choices available to supply chain managers. The inner core represents the Performance layer, articulating the five interdependent outcome dimensions against which supply chain excellence is assessed. Arrows between the layers signify the dynamic, recursive relationships through which contextual conditions shape innovation choices and innovation choices in turn reshape contextual realities over time.

The bidirectional arrows depicted in Figure 1 are not a stylistic embellishment but represent a substantive theoretical claim: performance outcomes are not terminal but feed back into the Context layer, altering the regulatory, competitive, and market conditions that constrain and enable subsequent rounds of innovation choice. A firm's demonstrated resilience performance, for example, can alter its bargaining position with suppliers and regulators, thereby changing the contextual conditions it faces in the following planning cycle. This recursive structure is what distinguishes the CIPM from a static maturity model. Contextual Intelligence, the core managerial competency the framework requires, can be operationally defined as the capacity to accurately diagnose which contextual variables are binding constraints in a given setting, to select innovation responses calibrated to those specific constraints rather than to generic best practice, and to revise that diagnosis as performance outcomes alter the contextual landscape over time. In practice, this competency is attained through structured environmental scanning routines, cross-functional review of performance-to-context feedback at fixed intervals, and deliberate investment in the organisational learning capabilities.

CONTEXT LAYER (Outer)

Geopolitical | Regulatory | Market | Technological | Ecological Conditions

INNOVATION LAYER (Middle)

Network Design | Risk & Resilience | Sustainability | Digital Transformation | Inventory

Transportation | Procurement | Human Factors | Humanitarian Logistics | Quantitative Methods

PERFORMANCE LAYER (Core)

Efficiency | Resilience | Sustainability | Responsiveness | Social Equity

[Dynamic, recursive relationships between layers indicated by bidirectional arrows]

Figure 1: The CIPM Supply Chain Management Framework

The framework makes three foundational theoretical claims that distinguish it from existing integrative models in the supply chain literature. The first is that supply chain performance is emergent rather than engineered. It arises from the dynamic interaction between contextual conditions and innovation choices rather than from the straightforward application of optimal design templates. This claim finds strong empirical support in the evidence reviewed across all ten domains: strategies that generate performance advantages in one context consistently fail to do so in others, and the mechanisms through which innovation generates performance improvement are invariably mediated by contextual conditions that static frameworks cannot accommodate. The second claim is that the five performance dimensions are interdependent and that apparent trade-offs among them are frequently neither fixed nor unavoidable. Digital transformation investments, properly designed and contextually appropriate, can simultaneously improve efficiency, strengthen resilience, and reduce environmental impact. The third claim is that human and behavioural factors are not peripheral complications to be managed at the margins of supply chain strategy but are central and often decisive determinants of supply chain performance, particularly in the domains of technology adoption, disruption response, and organisational learning.

Discussion

The Convergence of Resilience, Sustainability, and Digital Transformation

Perhaps the most consequential finding to emerge from this review is the degree to which resilience, sustainability, and digital transformation have converged from parallel strategic agendas into a unified and mutually reinforcing performance imperative. This convergence is substantive rather than merely rhetorical. The operational capabilities required to build resilient supply chains, including real-time network visibility, dynamic reconfiguration capacity, intelligent demand sensing, and rapid response to disruption signals, are in large measure the same capabilities required to pursue sustainability objectives through carbon footprint monitoring, route efficiency optimisation, and circular material flow management. A well-implemented digital twin enables simultaneously both disruption scenario planning and life cycle carbon footprint simulation. Blockchain-based traceability systems simultaneously support food safety verification and ethical sourcing assurance. Artificial intelligence-assisted demand forecasting simultaneously reduces stockout risk and overproduction waste.

The CIPM Supply Chain Management Framework provides a principled basis for articulating and acting on this convergence. By situating resilience investment, sustainability innovation, and digital transformation within the same Innovation layer of the model and by demonstrating that their outcomes interact positively across multiple Performance dimensions, the framework provides a coherent argument for integrated programme design and shared governance. The practical implication is significant: investment cases for supply chain transformation need to be evaluated against a multi-dimensional performance scorecard rather than through single-variable business cases that capture only one dimension of value creation.

Human Factors as a Binding Constraint on Transformation

A second major finding from this review is the extent to which human and behavioural factors function as binding constraints on supply chain performance improvement across virtually all domains, including those that are primarily framed as technical problems with technical solutions. The blockchain adoption literature offers a particularly instructive illustration. The technology itself has been technically mature for several years, yet commercial deployment at supply chain scale remains limited. The principal barriers are not technical but relational and behavioural: the willingness of supply chain partners to share proprietary data within a shared blockchain ecosystem depends on levels of inter-organisational trust, governance structures that equitably distribute costs and benefits, and perceptions of reciprocity that technology cannot manufacture and that must be built through sustained relationship investment.

The talent dimension is equally significant. The World Economic Forum's (2020) assessment that supply chain and logistics functions are among those most exposed to workforce disruption from automation and digitalisation has been borne out by subsequent research documenting widening gaps between available workforce competencies and the analytical, technological, and relational skill requirements of contemporary supply chain roles. The CIPM addresses this challenge by positioning human capability availability within the Context layer of the model, which has the important implication that the development of human capabilities is an environmental condition that must be actively managed rather than passively assumed.

Bridging Commercial and Humanitarian Supply Chain Management

The review of humanitarian and healthcare logistics conducted in Section 4.10 highlights the considerable distance that continues to separate commercial and humanitarian supply chain management as intellectual and practical communities, despite the clear potential for productive cross-fertilisation. The pressures of multi-stakeholder accountability, extreme resource constraint, political visibility, and compressed decision timeframes that characterise humanitarian supply chain operations are sufficiently distinctive to challenge the direct applicability of commercially derived frameworks and best practices. At the same time, the mainstream supply chain innovations reviewed in this paper, encompassing digital tracking systems, machine learning-assisted demand estimation, and dynamic inventory positioning models, hold substantial and largely unrealised potential to improve humanitarian supply chain performance, provided they are appropriately adapted to the specific contextual conditions of humanitarian operations rather than transplanted without modification.

The CIPM is particularly well suited to guiding this adaptation because its foundational insistence on contextual sensitivity prevents the uncritical transfer of context-specific models across radically different institutional environments. The questions that the CIPM directs practitioners and researchers to ask when entering a new context, namely what are the prevailing institutional conditions, what innovation choices are feasible within those conditions, and how should performance be evaluated given the primary objectives of this context, are precisely the questions that must be answered when adapting commercial supply chain thinking to humanitarian applications.

Policy Implications

The convergence thesis and the integrative CIPM framework carry important implications for policymakers operating at national and supranational levels. The European Union's simultaneous development of the Corporate Sustainability Reporting Directive, the proposed Supply Chain Due Diligence Act, and digital single market infrastructure reflects, implicitly, an understanding that supply chain governance cannot be addressed through single-domain regulatory instruments. The CIPM framework provides a theoretical basis for the argument that effective supply chain policy must be designed and evaluated in an integrated manner, with sustainability mandates, digital infrastructure investment, and resilience incentive mechanisms developed and assessed as components of a unified governance agenda rather than as separate legislative priorities. National governments considering industrial policy responses to supply chain vulnerabilities, including decisions about strategic stockpiling, near-shoring incentives, and critical infrastructure designation, would benefit from a similarly integrated analytical framework.

Research Agenda and Future Directions

The CIPM Supply Chain Management Framework generates a set of specific and testable propositions that together constitute a forward-looking research agenda for the field. The research gaps identified across the ten domains reviewed in Section 4 motivate each of the following propositions.

The first proposition holds that the positive relationship between digital transformation investment and supply chain resilience performance will be positively moderated by the degree of human-automation collaboration maturity within the investing organisation. Firms with higher levels of human-automation collaboration capability will extract greater resilience value from equivalent digital investments than firms at lower maturity levels, because the effective use of digital tools in disruption response depends on the quality of human-machine teaming rather than on technology capability alone. This proposition is amenable to empirical testing through survey-based or case study research across industries at varying stages of automation deployment.

The second proposition holds that supply chain network configurations explicitly designed to integrate sustainability objectives, including geographic diversification, modal balance, and minimisation of long-haul air freight dependence, will demonstrate greater resilience under climate-related disruption scenarios than configurations optimised for cost efficiency alone. The reasoning is that sustainable design criteria tend to produce network architectures with properties, including redundancy, geographic spread, and modal flexibility, that are also associated with greater resilience. This proposition could be examined through longitudinal analysis of firm-level supply chain performance data across documented disruption events.

The third proposition calls for research that systematically bridges the commercial and humanitarian supply chain management literatures through comparative organisational studies. Pharmaceutical companies engaged in both commercial distribution networks and humanitarian medicine supply programmes represent a particularly promising research site, as they must manage the interface between two fundamentally different supply chain logics within a single organisational context.

A fourth line of inquiry concerns the behavioural dimensions of supply chain decision-making under conditions of geopolitical uncertainty. Existing research on this topic is dominated by structural modelling approaches that treat decision-making as a rational optimisation process. The application of behavioural economics and cognitive psychology frameworks to questions such as how supply chain managers process geopolitical risk signals and how cognitive biases influence the timing and nature of nearshoring or reshoring decisions represents a substantial and largely unexplored research opportunity with direct implications for managerial practice.

Conclusion

This paper has argued for the value and necessity of an integrative framework that can articulate the interdependencies among the multiple domains that collectively shape supply chain performance in the contemporary operating environment. The fragmentation of the existing literature, while a natural consequence of disciplinary specialisation and the productive division of scholarly labour, has created a gap between the comprehensive and interconnected challenges that supply chain practitioners face daily and the partial and siloed frameworks currently available to guide their decisions. The CIPM Supply Chain Management Framework, grounded in the Contextual Innovation Performance Model developed by Sambiri (2022, 2024) and informed by an extensive review of Scopus-indexed scholarship across ten thematic domains, represents a systematic attempt to close that gap.

The framework's three core theoretical claims, that performance is emergent rather than engineered, that the five performance dimensions are interdependent rather than in fixed trade-off, and that human and behavioural factors are central rather than peripheral determinants of supply chain performance, carry implications that extend across the full range of supply chain management scholarship and practice. For researchers, the framework provides a basis for designing studies that examine cross-domain interactions and that generate cumulative knowledge about how supply chain systems actually function. For practitioners, it provides a diagnostic tool for evaluating the alignment between innovation choices and contextual conditions and a vocabulary for constructing integrated and multi-dimensional investment cases for supply chain transformation.

Supply chains will continue to face compounding pressures from geopolitical restructuring, ecological change, technological disruption, and evolving societal expectations for the foreseeable future. Organisations that develop the contextual intelligence, the integrated innovation capability, and the multi-dimensional performance orientation articulated in the CIPM Supply Chain Management Framework will be better positioned to generate sustained value under these conditions than those that pursue narrow technical optimisation within any single domain.

REFERENCES

Alicke, K., Barriball, E., & Trautwein, V. (2022). How COVID-19 is reshaping supply chains. *McKinsey Quarterly*. https://www.mckinsey.com/capabilities/operations/our-insights/how-covid-19-is-reshaping-supply-chains

Allen, J., Browne, M., Woodburn, A., & Leonardi, J. (2018). The role of urban consolidation centres in sustainable city logistics. *Transport Reviews, 32(4)*, 473-490. https://doi.org/10.1080/01441647.2012.688074

Balcik, B., Beamon, B. M., Krejci, C. C., Muramatsu, K. M., & Ramirez, M. (2010). Coordination in humanitarian relief chains: Practices, challenges and opportunities. *International Journal of Production Economics, 126(1)*, 22-34. https://doi.org/10.1016/j.ijpe.2009.09.008

Bendoly, E., Donohue, K., & Schultz, K. L. (2006). Behavior in operations management: Assessing recent findings and revisiting old assumptions. *Journal of Operations Management, 24(6)*, 737-752. https://doi.org/10.1016/j.jom.2005.10.001

Bolton, P., & Dewatripont, M. (2005). *Contract theory*. MIT Press.

Carbonneau, R., Laframboise, K., & Vahidov, R. (2008). Application of machine learning techniques for supply chain demand forecasting. *European Journal of Operational Research, 184(3)*, 1140-1154. https://doi.org/10.1016/j.ejor.2006.12.004

Choi, T. Y., & Linton, T. (2011). Don't let your supply chain control your business. *Harvard Business Review, 89(12)*, 112-117.

Christopher, M., & Towill, D. R. (2001). An integrated model for the design of agile supply chains. *International Journal of Physical Distribution and Logistics Management, 31(4)*, 235-246. https://doi.org/10.1108/09600030110394914

Dickson, G. W. (1966). An analysis of vendor selection systems and decisions. *Journal of Purchasing, 2(1)*, 5-17. https://doi.org/10.1111/j.1745-493X.1966.tb00818.x

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review, 48(2)*, 147-160. https://doi.org/10.2307/2095101

Ellen MacArthur Foundation. (2013). *Towards the circular economy: Economic and business rationale for an accelerated transition*. Author.

Govindan, K., & Soleimani, H. (2017). A review of reverse logistics and closed-loop supply chains: A journal of cleaner production focus. *Journal of Cleaner Production, 142*, 371-384. https://doi.org/10.1016/j.jclepro.2016.03.126

Hohenstein, N. O., Feisel, E., Hartmann, E., & Giunipero, L. (2015). Research on the phenomenon of supply chain resilience: A systematic review and paths for further investigation. *International Journal of Physical Distribution and Logistics Management, 45(1/2)*, 90-117. https://doi.org/10.1108/IJPDLM-05-2013-0128

Hubner, A., Holzapfel, A., & Kuhn, H. (2016). Distribution systems in omni-channel retailing. *Business Research, 9(2)*, 255-296. https://doi.org/10.1007/s40685-016-0034-7

Ivanov, D. (2021). Viable supply chain model: Integrating agility, resilience and sustainability perspectives. *TQM Journal, 32(6)*, 1483-1508. https://doi.org/10.1108/TQM-04-2020-0066

Ivanov, D., & Dolgui, A. (2021). A digital supply chain twin for managing the disruption risks and resilience in the era of Industry 4.0. *Production Planning and Control, 32(9)*, 775-788. https://doi.org/10.1080/09537287.2020.1768450

Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.

Kinkel, S. (2022). Trends in production relocation and backshoring activities: Changing patterns in the course of the COVID-19 pandemic. *International Journal of Operations and Production Management, 42(12)*, 1863-1882. https://doi.org/10.1108/IJOPM-07-2021-0445

Lee, H. L., Padmanabhan, V., & Whang, S. (1997). Information distortion in a supply chain: The bullwhip effect. *Management Science, 43(4)*, 546-558. https://doi.org/10.1287/mnsc.43.4.546

Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *International Journal of Logistics Management, 20(1)*, 124-143. https://doi.org/10.1108/09574090910954873

Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research*, *57(7)*, 2117-2135. https://doi.org/10.1080/00207543.2018.1533261

Sambiri, B. (2022). *The contextual innovation performance model: Towards a unified framework for management research in developing and transitional economies*. Unpublished doctoral framework, Exploits University, Malawi.

Sambiri, B. (2024). Applying the contextual innovation performance model to higher education management in African private universities. *International Journal of Learning, Research and Higher Education Studies in Social Sciences, 9(5)*, 1-22.

Savelsbergh, M., & Van Woensel, T. (2016). City logistics: Challenges and opportunities. *Transportation Science*, *50(2)*, 579-590. https://doi.org/10.1287/trsc.2016.0675

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

Sheffi, Y. (2020). *The new (ab)normal: Reshaping business and supply chain strategy beyond COVID-19*. MIT CTL Media.

Simchi-Levi, D., Haren, P., & Simchi-Levi, J. (2020). From superstorms to factory fires: Managing unpredictable supply-chain disruptions. *Harvard Business Review*, March-April. https://hbr.org/2020/01/from-superstorms-to-factory-fires-managing-unpredictable-supply-chain-disruptions

Spiliotis, E., Abolghasemi, M., Hyndman, R. J., Petropoulos, F., & Assimakopoulos, V. (2022). Hierarchical forecast reconciliation with machine learning. *Applied Soft Computing, 112,* Article 107756. https://doi.org/10.1016/j.asoc.2021.107756

Stacey, R. D. (2010). *Complexity and organizational reality: Uncertainty and the need to rethink management after the collapse of investment capitalism* (2nd ed.). Routledge.

Tao, F., Zhang, H., Liu, A., & Nee, A. Y. C. (2019). Digital twin in industry: State-of-the-art. *IEEE Transactions on Industrial Informatics*, *15(4)*, 2405-2415. https://doi.org/10.1109/TII.2018.2873186

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18(7)*, 509-533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

Tomasini, R., & Van Wassenhove, L. N. (2009). *Humanitarian logistics*. Palgrave Macmillan.

Villena, V. H., & Gioia, D. A. (2020). A more sustainable supply chain. *Harvard Business Review, 98(2)*, 84-93.

World Economic Forum. (2020). *The future of jobs report 2020*. Author. https://www.weforum.org/reports/the-future-of-jobs-report-2020