Guest editorial: The value of data in the digital supply chain

Industrial Management & Data Systems

1. Introduction

The proliferation of digital technologies across firms has accelerated the emergence of the Digital Supply Chain (DSC), a customer-centric, data-driven, platform-based operational paradigm aimed at maximizing value creation (Nasiri *et al.*, 2020; Brau *et al.*, 2023; Boyson *et al.*, 2022). Supported by digital technologies such as artificial intelligence (AI), blockchain, cloud computing, social media, the Internet of Things (IoT) and the Industrial Internet, DSC facilitates the seamless flow of capital, data, resources, goods and services. By enabling multi-dimensional connectivity among suppliers, manufacturers, distributors, service providers and end consumers, DSC offers unprecedented levels of end-to-end visibility, inter-organizational coordination, market responsiveness and operational resilience (Zhao *et al.*, 2023). Real-world examples of DSC include Amazon's AI-powered supply chain planning systems [1], JD.com's Customer-to-Manufacturer (C2M) model [2] and SHEIN's Direct-to-Consumer (DTC) model [3], all of which have generated substantial competitive advantages.

Within DSCs, data constitutes the primary engine of intelligent operations and value creation (Cohen *et al.*, 2026; Ritala *et al.*, 2024). In particular, data are generated, circulated and utilized throughout the lifecycle of DSC development and operation, arising from market demand, business operational execution and order fulfillment processes (Brau *et al.*, 2023; Boyson *et al.*, 2022). According to the Chinese National Standard GB/T 46,887-2025, such data include but are not limited to, demand (e.g. scale of market demand, customer profiles and competitive pricing information), operational (e.g. planning, procurement, production, warehousing, logistics, sales, service and collaboration), and order (e.g. order quantity, identifier and fulfillment status) data. As an increasingly recognized production factor, data exhibit distinctive economic features, including increasing returns to scale, non-excludability, low-cost reusability and positive externalities (Huang *et al.*, 2021; Günther *et al.*, 2022). When effectively mobilized, data can give rise to coordinated supply chain flows, promote inter-organizational knowledge diffusion, upgrade production tools, accelerate the development of data-driven service offerings and enable new business models (Boyson *et al.*, 2022; Ritala *et al.*, 2024), which in turn enhances supply chain optimization and innovation.

Yet, extracting value from data in DSC remains far from straightforward. Significant challenges persist across the interconnected domains of data processing, application and governance (Smania *et al.*, 2024; Boyson *et al.*, 2022). In data processing, the DSC has shifted from traditional transaction-based systems toward end-to-end active sensing and intelligent decision-making architectures (Cohen *et al.*, 2026). This technological evolution, however, has introduced two major bottlenecks. First, because data in DSC are often co-generated by multiple supply chain stakeholders, ownership boundaries are frequently ambiguous and traceability remains inadequate, thereby increasing the risk of unauthorized access, use and misuse (Smania *et al.*, 2026). Second, heterogeneous data management systems across organizations create inconsistencies in data formats, transmission protocols and quality-control standards, which further impede data integration and constrain value extraction (Cohen *et al.*, 2026). These challenges point to the necessity of a robust and scalable data processing framework that can clarify data ownership, harmonize inter-organizational data standards, ensure end-to-end data integrity and establish compliant data sharing protocols.

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In terms of data application, the realization of data value depends critically on effective human–AI collaboration and data-driven business transformation. In complex DSC settings, AI serves to augment rather than replace human judgment, rendering the value generated from data highly contingent on the effectiveness of human–AI collaboration (Cohen *et al.*, 2026; Dai and Swaminathan, 2025). However, a substantial theoretical gap remains in our understanding of how human domain expertise can be effectively integrated with AI-driven insights to address emerging and complex contingencies in supply chain operations (Dai and Swaminathan, 2025). Meanwhile, intelligent data applications are blurring the boundaries between digital and physical domains, driving supply chain transformation toward omnichannel integration (Li *et al.*, 2023), platform-based operations (Mak and Shen, 2021) and servitization (Chen *et al.*, 2022). Yet, the mechanisms through which these data-driven transformations unfold remain insufficiently understood, underscoring the need to identify their core mechanisms, boundary conditions and implementation pathways.

Data governance presents a further set of pressing challenges. Unlocking data value is inherently accompanied by the accumulation of risk (Kumar and Mallipeddi, 2022). The aggregation and flow of multi-source heterogeneous data across supply chain networks create unprecedented governance complexity and heighten the risks of data leakage, tampering and noncompliant cross-border transmission. Under such conditions, deriving a holistic mechanism for data risk identification and prevention becomes essential to the sustainable realization of data value (Kumar and Mallipeddi, 2022). Furthermore, because data value is context-dependent and characterized by nonlinear marginal utility, traditional volume-based pricing approaches are increasingly inadequate (Huang *et al.*, 2021). There is still no widely accepted standard for quantifying the contributions of distinct supply chain stakeholders to value creation or for designing fair and incentive-compatible revenue-sharing mechanisms (Huang *et al.*, 2021). The absence of such mechanisms discourages data sharing, especially among disadvantaged participants in the supply chain ecosystem. Taken together, these issues call for an integrated governance framework that connects end-to-end value creation with full-chain risk management.

Against this backdrop, systematically addressing the challenges of data processing, application and governance is essential to unlocking the value of data in DSC. This Special Issue, entitled "The Value of Data in the Digital Supply Chain", offers a timely forum for scholars and practitioners to advance cutting-edge insights, methodologies and solutions in this important domain. By bringing together cross-disciplinary research and empirical evidence, the Special Issue seeks to deepen our appreciation of how data can be transformed into operational and strategic value and, in turn, support the digital transformation of global supply chains.

2. Contributions to this special issue

This Special Issue received 52 submissions from scholars around the world. Adhering to a rigorous, multi-round review process, 13 manuscripts were ultimately accepted, yielding an acceptance rate of 25%. As summarized in Table 1, these articles systematically extend contemporary research on the value of data in DSC. Collectively, they can be organized into three interrelated research topics: (1) data processing, (2) data application and (3) data governance in the DSC.

2.1 Data processing in digital supply chain (DSC)

Two articles focus on data processing in the DSC. Sui *et al.* (2025) investigated optimal data collection and pricing decisions for duopolistic two-sided platforms acting as data intermediaries. They demonstrate that when the gap in data collection costs is high, the cost-advantaged platform should fully collect data and stipulate prices with reference to its competitor, whereas the disadvantaged platform should partially collect data and adopt cost-

Table 1. Overview of articles accepted for this Special Issue

Article	Research Question	Methodology	Topic
Sui, Gao and Li	How do competitive two-sided platforms optimize the collection and pricing of user-generated data?	Analytical model	Data Processing in DSC
Li, Zheng, Feng and Xie	How do enterprise customers decide between in-house data storage and original equipment manufacturer (OEM)-entrusted storage in the industrial IoT context?	Analytical model	
Chen, Fang, Li, Li and Xu	What is the effect of supply chain digitization on corporate digital innovation?	Difference-in-Differences (DID) analysis using archival data	Data Application in DSC
Guo, Zhen, Nie and Yao	What is the effect of supply chain digitalization on corporate environmental misconduct?	Difference-in-Differences (DID) analysis using archival data	
Alyasein, Ojha, Rayman and Gligor	How can supply chain digitalization contribute to organizational disaster immunity capability?	Survey analysis and a vignette-based experiment	
Gu, Xie, Zhang, Yang and Huo	What is the effect of supply chain digitalization on supply chain transparency?	Logit regression using archival data	
Wang, Sun and Li	What is the effect of data element market development on corporate supply chain configurations?	Difference-in-Differences (DID) analysis using archival data	
Liu and Yan	How can digital technology and business data be integrated to improve hospital medical waste management?	Business process analysis	
Wang, Xu and Liu	What is the optimal pricing strategy for new energy vehicles under integrated battery leasing systems and government subsidies?	Analytical model	
Deng, Li and Liang	How can pharmaceutical inventory be optimized under supply and demand uncertainty?	Hessian analysis with archival data validation	
Chen, Huang, Li and Balasubramanian	How can online retailers leverage return data to improve return service design?	Analytical model	
Li, Cheng and Møller	How has data governance been studied in the operations and supply chain management domain?	Systematic literature review	Data Governance in DSC
Peng, Shi and Li	What are the effects of data security supervision and smart product-service systems integration in a digital servitization supply chain?	Analytical model	

based pricing. When the cost gap is small, platforms tend to adopt similar strategies: both fully collect data with uniform pricing when costs are low, or both partially collect data with cost-plus pricing when costs are high. Li *et al.* (2025) examined enterprise customers' choices between in-house data storage and original equipment manufacturer (OEM)-entrusted storage in the Industrial IoT scenario. They find that in-house storage is preferable for high-value data when OEMs cannot provide commensurate data services. By contrast, OEM-entrusted storage

becomes more attractive when enterprise customers face high in-house data quality investments, possess weak internal data security and quality capacities and can obtain qualified data services from OEMs. Together, these studies provide nuanced insights into data collection, pricing and storage in the DSC.

2.2 Data application in digital supply chain (DSC)

Several studies focus on data application in DSC, covering both supply chain digitalization and data-driven operations. Four studies investigate the operational impacts of supply chain digitalization. Chen *et al.* (2025a) leverage China's Supply Chain Innovation and Application Pilot Policy as a quasi-natural experiment to illustrate that supply chain digitization promotes corporate digital innovation. Based on the same policy context, Guo *et al.* (2025) revealed that supply chain digitalization significantly reduces corporate environmental misconduct. Alyasein *et al.* (2026), blending a survey with vignette-based experiments, discovered that supply chain digitalization strengthens disaster immunity capability through the mediating roles of supply chain process integration and innovation speed. In contrast, Gu *et al.* (2025) offer more cautionary advice, showing that supply chain digitalization may reduce supplier disclosure because firms become more concerned about data leakage risks. Collectively, these studies suggest that supply chain digitalization not only improves corporate innovation, environmental performance and operational resilience but also reshapes supplier disclosure decisions.

Data are also transforming various supply chain operations, including supply chain structure, waste management, pricing strategy, inventory management and return service design. Wang *et al.* (2025b) find that the development of the formal data element market promotes supply chain diversification. Liu and Yan (2025) reveal that digital technologies and business data can be jointly leveraged to improve hospital medical waste management. In the context of new energy vehicles (NEVs), Wang *et al.* (2025a) show that when battery leasing prices fall below sales prices, both charging and swapping fees decrease as leasing rates rise; consumer subsidies expand demand for battery-swapping vehicles, while manufacturer subsidies promote charging-based adoption. Deng *et al.* (2026) address pharmaceutical inventory management under supply and demand uncertainty and show that risk-aware optimization can substantially reduce costs while maintaining high service levels. Chen *et al.* (2025b) further show that retailers can harness detailed return data to design effective return services, with the relative attractiveness of return freight insurance versus pickup services depending on the market structure and distribution of customer return costs. Taken together, these studies attest to the broad operational value of data across diverse supply chain settings.

2.3 Data governance in digital supply chain (DSC)

Data governance has emerged as a critical concern in supply chain operations. Li *et al.* (2026) systematically review data governance research in operations and supply chain management and find that past studies remain fragmented and overly focused on technical dimensions. They call for integration of technical, organizational and socio-behavioral aspects of data governance; the development of cross-domain frameworks linking product development, manufacturing and supply chain processes; as well as theoretical grounding and methodological diversity to better capture the complexities of data-driven operations. Peng *et al.* (2025) further explored data governance in digital servitization supply chains and showed that collaborative data security supervision by platforms and governments can improve transaction volume, prices and profits, even though the benefits are unevenly distributed across supply chain participants. Overall, these studies highlight that extracting value from data demands governance mechanisms that balance security, incentives, coordination and performance across organizational boundaries.

3. Conclusion

The articles in this Special Issue advance research on the value of data in DSC by generating novel insights across the three interrelated domains of data processing, data application and data governance. First, the articles clarify how firms and platforms can make effective decisions regarding data collection, pricing and storage under varying cost structures, security conditions and service capabilities (Sui *et al.*, 2025; Li *et al.*, 2025). Second, empirical evidence shows that supply chain digitalization affects corporate innovation (Chen *et al.*, 2025a), environmental performance (Guo *et al.*, 2025), operational resilience (Alyasein *et al.*, 2026) and supplier disclosure (Gu *et al.*, 2025). Meanwhile, research on data-driven operations demonstrates how data can support supply chain network configuration (Wang *et al.*, 2025b), inventory optimization (Deng *et al.*, 2026), medical waste management (Liu and Yan, 2025), product pricing (Wang *et al.*, 2025a) and return service design (Chen *et al.*, 2025b). Finally, research on data governance highlights the importance of addressing data security, ownership, supervision and value appropriation to ensure that the benefits of data can be realized in a sustainable and coordinated manner (Li *et al.*, 2026; Peng *et al.*, 2025).

At the same time, this Special Issue leaves several important challenges unresolved, including the persistence of data silos, the difficulty of achieving human–AI collaboration in complex operational settings, and the lack of scalable governance arrangements for data sharing, valuation and risk control across organizational boundaries. Future research should therefore take into account cross-organizational data integration, human–AI collaborative decision processes and trust-based governance frameworks that can support broader ecosystem coordination. Addressing these challenges will be essential for moving supply chains beyond digitization toward genuinely intelligent, resilient and innovative next-generation DSCs.

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Notes

1. https://logisticsviewpoints.com/2025/03/26/amazon-and-the-shift-to-ai-driven-supply-chain-planning
2. https://jdcorporateblog.com/jd-c2m-supply-chains-journey-from-mass-market-to-niche-market
3. https://www.retail-insight-network.com/interviews/shein-disrupting-e-commerce-future-of-retail

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