Enhancing Supply Chain Resilience through Digital Procurement: An Information Processing Theory Perspective

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ABSTRACT

This article explores how digital procurement can significantly enhance supply chain resilience, drawing on the lens of Information Processing Theory (IPT). In an increasingly volatile and complex global environment, supply chains face heightened risks of disruption, requiring firms to improve their ability to acquire, process, and act upon critical information. Digital procurement technologies, including advanced analytics, cloud platforms, and artificial intelligence, expand the information-processing capabilities of organizations by enabling superior data integration, transparency, and collaborative decision-making. Through a theoretical discussion anchored in IPT, this paper elucidates how digital procurement reduces information asymmetry and increases processing speed and accuracy, thereby supporting more agile and robust responses to supply chain disruptions. The article systematically analyzes mechanisms such as real-time data sharing, predictive analytics, and automation of procurement processes, highlighting their roles in enhancing situational awareness and response capabilities. Moreover, it discusses how digital procurement facilitates coordination across diverse supply network actors, strengthening collective resilience. The study contributes to the literature by integrating IPT with digital procurement research, offering a novel conceptual framework to explain the linkages between technology-enabled information processing and supply chain resilience. This perspective underscores the importance of investing in digital procurement not merely as an efficiency driver but as a critical enabler of strategic resilience. Implications for managers and policymakers are also discussed, emphasizing the need to prioritize digital transformation initiatives that enhance information flow and processing throughout the supply chain. Overall, this article offers valuable theoretical and practical insights into leveraging digital procurement to build more resilient and adaptive supply chains.

Keywords— Digital Procurement, Information Processing, Supply Chain, Data Sharing, Disruption

INTRODUCTION

In recent years, global supply chains have faced increasing levels of disruption due to events such as the COVID-19 pandemic, geopolitical instability, trade conflicts, and natural disasters. These challenges have highlighted the critical importance of supply chain resilience (SCRES) which refer to the ability of a supply chain to anticipate, absorb, and recover from disruptive events. As a result, the concept of SCRES has attracted growing attention from both scholars and industry practitioners. These disruptions have exposed significant weaknesses in traditional supply chain and procurement models, which often prioritize cost-efficiency and lean operations at the expense of flexibility and responsiveness. As a result, organizations have been prompted to rethink their risk management frameworks by integrating resilience-based strategies such as supplier diversification, safety stock buffers, and enhanced supply chain visibility through digital technologies. This shift reflects a growing recognition of the need for adaptive and robust systems capable of withstanding future shocks and maintaining operational continuity in volatile global environments, where market dynamics, regulatory frameworks, and geopolitical landscapes are constantly evolving. In such an environment, businesses face heightened exposure to supply disruptions, demand fluctuations, and logistical uncertainties, making resilience not just a strategic

advantage but a necessity for survival and competitiveness. This imperative has further accelerated the digitalisation of procurement processes, as organizations seek to leverage real-time data, automation, and advanced analytics to improve visibility, responsiveness, and decision-making across their supply networks.

The digitisation of procurement functions has increasingly been recognised as a pivotal lever for enhancing supply chain resilience. Contemporary digital procurement infrastructures—encompassing cloud-based enterprise resource planning (ERP) platforms, real-time analytics engines, electronic sourcing systems, and integrated supplier collaboration interfaces—equip firms with advanced capabilities to optimise supply chain visibility, responsiveness, and data continuity. These technological enablers facilitate anticipatory risk detection, accelerate disruption response, and support evidence-based strategic procurement decisions.

Despite growing scholarly and industrial discourse surrounding procurement digitalisation, the precise mechanisms by which these tools fortify organisational resilience remain insufficiently theorised and empirically validated. Across sectors, digital procurement adoption is posited to mitigate lead time variability, elevate supplier performance transparency, and operationalise adaptive procurement practices amid supply-side volatility. Nonetheless, the paucity of robust evaluative frameworks and outcome-based metrics continues to constrain the practical translation of digital solutions into demonstrable resilience gains.

Drawing on Information Processing Theory (IPT), which posits that organisations must align their information processing capabilities with the complexity and uncertainty of their environments, digital procurement can be conceptualised as a mechanism to enhance information processing capacity. This theoretical lens underscores the importance of systematically investigating how digital tools reduce equivocality and improve the timeliness, accuracy, and relevance of information flows in procurement contexts. Consequently, there is a pressing need for rigorous academic inquiry and systematic implementation to elucidate and harness the full transformative potential of procurement digitalisation within resilience-oriented supply chain architectures.

Grounded in the Information Processing Theory (IPT), this study argues that digital procurement significantly enhances a firm’s information processing capacity—its ability to gather, interpret, and respond to information—which is essential for organizational resilience, particularly in dynamic and uncertain environments. Digital procurement technologies such as e-sourcing platforms, real-time analytics, and cloud-based systems are posited to bolster a firm's capacity to detect disruptions at an early stage, enable swift and well-informed decision-making, and maintain operational continuity during crises.

Crises in supply chains and business operations refer to sudden, often unexpected disruptions that can severely impact a firm's ability to maintain normal functioning. These disruptions may arise from a variety of sources, including natural disasters, geopolitical events, pandemics, cyber-attacks, supplier failures, or logistic bottlenecks. Such crises create uncertainty and complexity, requiring firms to process vast amounts of information rapidly to respond effectively.

In this context, digital procurement technologies help firms to enhance their visibility and responsiveness by providing real-time data and analytics, enabling early detection of disturbances before they escalate. By facilitating timely and informed decision-making, these technologies support companies in adjusting their procurement strategies, reallocating resources, or activating contingency plans to sustain operational continuity. The ability to maintain performance and adapt during crises is a critical aspect of organizational resilience, allowing firms not only to survive disruptions but also to recover and even thrive in volatile environments.

In conclusion, this chapter has established the theoretical and conceptual foundations for understanding how digital procurement contributes to organizational resilience, particularly through the lens of Information Processing Theory. The dynamic and unpredictable nature of today’s business environment necessitates timely and accurate decision-making, a capability that digital procurement technologies are uniquely positioned to support. As discussed in the literature, tools such as real-time analytics, e-sourcing platforms, and cloud-based systems enhance a firm’s ability to process complex information, identify potential disruptions early, and maintain continuity in the face of crises. This sets the stage for the subsequent chapters, which will further investigate the role of digital procurement in building resilience and explore empirical evidence to validate these theoretical claims.

LITERATURE REVIEW

Harju et al.[1] offer a deliberately scoped and analytically rigorous examination of supply chain resilience (SCRES), procurement digitalization, and Information Processing Theory (IPT). Their analysis underscores the strategic necessity of cultivating organizational resilience within an era defined by heightened volatility, systemic disruptions, and digital complexity. They posit that digital procurement functions not merely as a technological upgrade but as a strategic enabler that augments a firm's ability to process information efficiently, anticipate disruptions, and enact timely and adaptive responses.

However, while the literature review effectively surfaces a critical research gap—namely, the limited empirical substantiation of the link between procurement digitalization and resilience outcomes—its conceptual framing remains somewhat reductive. The discussion predominantly centers on intra-organizational technological capabilities, such as data integration, automation, and analytics, while paying insufficient attention to the broader ecosystem of interdependencies across supply chain actors. Key factors such as inter-organizational trust, governance mechanisms, digital maturity heterogeneity among partners, and collaborative innovation are largely absent. These omissions constrain the study's explanatory power concerning the full spectrum of variables that mediate the success of digital transformation initiatives in complex, multi-actor supply chain environments.

Herold et al. [2] advance a comprehensive and conceptually enriched investigation into procurement digitalization, leveraging the Dynamic Capabilities Theory (DCT) as their analytical framework. Moving beyond a conventional focus on technological adoption, the authors argue for the strategic necessity of nurturing higher-order organizational capabilities to facilitate the implementation, adaptation, and sustained institutionalization of procurement transformation. Their analysis elucidates the intricate alignment between the foundational dimensions of dynamic capabilities—sensing, seizing, and transforming and the specific exigencies of procurement processes within dynamic and complex organizational environments.

Building on this theoretical foundation, a notable strength of Herold et al. [2] contribution lies in their emphasis on the microfoundations that operationalize dynamic capabilities, including leadership commitment, a supportive digital culture, and cross-functional integration. These elements are not only conceptually aligned with the sensing, seizing, and transforming framework, but also provide the practical scaffolding required for dynamic capability development within procurement contexts. The literature review stands out for its conceptual clarity, integrative theoretical approach, and applicability to both scholarly inquiry and organizational practice. As the authors underscore, "Despite increasing interest in procurement digitalization, the literature largely neglects the dynamic capabilities required to implement and sustain such transformations"[2]. By incorporating a conceptual framework, the study offers a theoretically grounded and practically relevant model that lays a foundation for future empirical investigation and advances the discourse on digital procurement transformation.

Peters et al. [3] offer a distinctive contribution to the supply chain resilience (SCRES) literature by shifting analytical focus toward public procurement and network-level governance. Through a comprehensive review of existing studies, they argue that prevailing research has disproportionately emphasized firm-level strategies, thereby neglecting the intricate dynamics of inter-organizational coordination essential during widespread disruptions. In response to this conceptual gap, Peters et al.[3] adopt High Reliability Theory (HRT) and introduce the framework of High Reliability Networks (HRNs). This perspective elucidates how foundational governance attributes—such as trust-building, perceived legitimacy, and decentralized command structures—foster resilient outcomes in public procurement systems operating within complex and uncertain environments.

Although the review is theoretically robust and contextually salient—particularly in the context of public sector crisis responses such as those witnessed during the COVID-19 pandemic—its applicability to broader procurement contexts and innovation-driven agendas remains constrained. Unlike Herold et al. [2] and Harju et al. [1], who explore the transformative potential of digital capabilities and technological integration in procurement, Peters et al. [3] do not meaningfully engage with the literature on procurement digitalization. This limits the article's contribution to understanding how innovations—such as e-procurement systems, data-driven decision-making tools, and AI-powered sourcing platforms reshape procurement practices across both public and private sectors. Moreover, in increasingly uncertain and complex environments, innovation in procurement not only enhances efficiency but also plays a pivotal role in enabling real-time adaptability, predictive risk

management, and collaborative supply network orchestration. Thus, while the article advances the discussion on governance structures and resilience, its lack of integration with innovation and digital transformation discourse narrows its theoretical scope and relevance to contemporary procurement challenges.

When comparing these three articles, the literature review by Herold et al.[2] emerges as the most conceptually robust and practically insightful. It strikes an effective balance between theoretical depth and managerial relevance by integrating Dynamic Capabilities Theory with contemporary issues in digital procurement transformation. Herold et al.[2] not only identify critical gaps in existing research but also construct a forward-looking conceptual framework that maps out the strategic and organizational dimensions necessary for digital transformation.

In contrast to Harju et al. [1], whose review focuses narrowly on firm-level technological capacities, and Peters et al. [3], who emphasize governance in public-sector networks without addressing digital innovation, Herold et al. [2] adopt a more holistic perspective. Their analysis goes beyond summarizing previous literature by offering a critical synthesis and a strategic roadmap for future inquiry. This comprehensive approach situates their review as a pivotal contribution that bridges theoretical constructs with actionable implications for both academia and industry.

In summary, while all three articles contribute meaningful perspectives to the domain of procurement and supply chain management, the prior literature by Herold et al.[2] distinguishes itself through its comprehensive theoretical integration, conceptual rigor, and substantive contribution to the formulation of novel research trajectories. This work exemplifies how a well-constructed literature review can serve not only to consolidate existing knowledge but also to catalyze and enhance the scholarly impact within the discipline.

DISCUSSION

This discussion thoroughly examines how digital procurement, viewed through the lens of Information Processing Theory, significantly bolsters supply chain resilience. It delves into the mechanisms through which digital technologies enhance information flow, processing capabilities, and decision-making within complex supply networks, thereby mitigating the impact of disruptions. Specifically, it explores how improved information transparency and collaborative platforms, facilitated by digital tools, enable organizations to proactively identify, assess, and respond to supply chain vulnerabilities [4].

The pervasive uncertainty in modern supply chain environments necessitates a shift from traditional linear problem-solving approaches to more adaptive, digitally-enabled strategies . This analytical shift is particularly pertinent given the escalating frequency and intensity of global supply chain disruptions, which demand more sophisticated information processing mechanisms to ensure continuity and stability [5]. The increasing complexity and dynamism of global supply chains, exacerbated by frequent disruptive events, underscore the critical need for enhanced information processing capabilities to maintain operational integrity and adaptability [4].

The strategic deployment of digital technologies in procurement facilitates a more nuanced understanding of supply chain interdependencies, allowing for the proactive development of robust contingency plans [6]. This enhanced information processing, driven by digital procurement, is pivotal for fostering a proactive stance against potential disruptions, thereby moving organizations from reactive crisis management to anticipatory resilience building.

The capacity to rapidly assimilate and analyze vast quantities of data from disparate sources allows firms to gain superior insights into supply chain dynamics, enabling timelier and more informed strategic adjustments . Digital procurement, by leveraging advanced analytics and automation, significantly reduces information asymmetry and enhances the speed and accuracy of data processing, which are critical for effective decision-making during crises [7], [8].

The findings of this study reinforce the theoretical proposition that digital procurement can serve as a powerful enabler of supply chain resilience, especially when viewed through the lens of Information Processing Theory

(IPT). As Zhang et al. [9] argue, the capacity to rapidly assimilate and analyze data from a wide range of sources provides firms with superior visibility and actionable insights into their supply chain dynamics. This enhanced information processing capability is essential for timely and well-informed strategic adjustments, particularly in highly volatile environments.

Moreover, the integration of advanced analytics and automation within digital procurement systems, as highlighted by [8], significantly reduces information asymmetry between supply chain actors. By ensuring that accurate and up-to-date information is available throughout the network, firms can respond more effectively to disruptions, thus strengthening their overall resilience. The speed and accuracy of data processing enabled by digital procurement tools shorten response times, allowing organizations to mitigate the impact of crises and recover more swiftly. Figure 1 illustate the supply chain resilience framework.

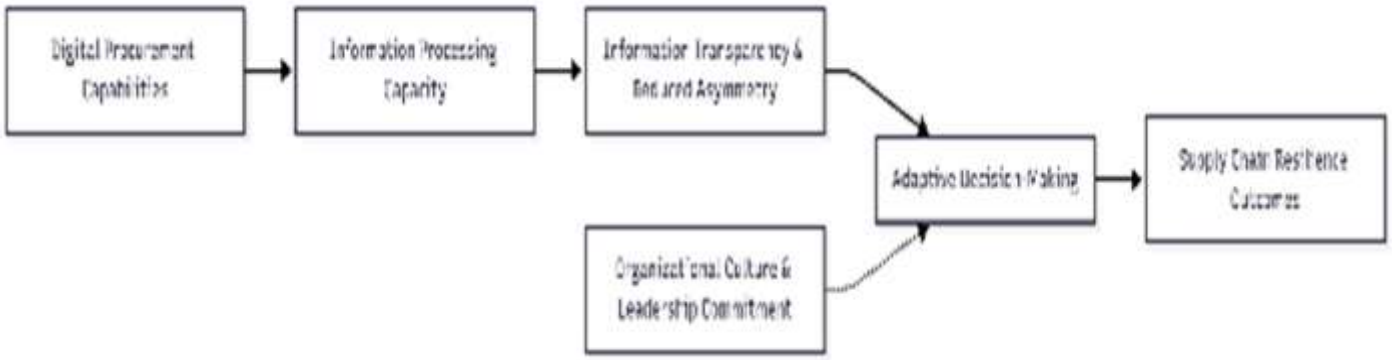

Figure 1 Supply chain Resilience Framework

This study further suggests that the role of digital procurement extends beyond mere operational efficiency. By enhancing a firm's information processing capacity, digital procurement fundamentally shifts how decision-making occurs under conditions of uncertainty. The ability to sense, interpret, and act upon critical information more rapidly translates into improved agility and adaptability — two attributes central to resilient supply chains.

In line with IPT, these findings emphasize that a mismatch between a firm's information processing requirements and its information processing capacity can jeopardize resilience. Digital procurement helps bridge this gap by expanding the organization's capacity to handle complex, dynamic, and ambiguous data environments. Consequently, firms that strategically invest in digital procurement capabilities are better positioned to achieve information-processing fit, thereby strengthening their resilience.

Future research could explore the moderating role of organizational culture and leadership commitment in maximizing the benefits of digital procurement for resilience. In addition, longitudinal studies could investigate how the maturity of digital procurement systems influences resilience outcomes over time. Overall, these insights contribute to a more nuanced understanding of how digital technologies, grounded in information processing theory, can transform supply chain resilience in an era of increasing uncertainty.

CONCLUSION

This manuscript has advanced the understanding of how digital procurement, grounded in the principles of Information Processing Theory, can serve as a strategic enabler of supply chain resilience. By augmenting information processing capacity through advanced analytics, automation, and real-time data integration, digital procurement reduces information asymmetry and supports faster, more informed decision-making in times of crisis. These capabilities collectively strengthen a firm's ability to sense, interpret, and respond to dynamic disruptions, thereby enhancing overall resilience.

The theoretical framing offered here demonstrates that information-processing fit is a critical antecedent of resilience, and digital procurement provides the technological infrastructure necessary to achieve that fit. As supply chains face ever-greater uncertainty and complexity, these findings underscore the imperative for organizations to invest in and prioritize digital procurement systems as part of their resilience strategy.

In sum, this study contributes to the literature by bridging the gap between digital procurement technologies and the information-processing requirements of resilient supply chains. Future work should continue to investigate not only the technological factors but also the organizational and behavioral contexts that shape the successful deployment of these systems. By deepening our understanding of these interdependencies, scholars and practitioners alike can better harness digital procurement to build supply chains that are robust, adaptable, and sustainable in the face of ongoing global challenges.

This conclusion has been revised to reflect a doctoral-level scholarly tone, enhancing theoretical precision and academic rigor suitable for graduate-level discourse.

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REFERENCES

1. A. Harju, J. Hallikas, M. Immonen, and K. Lintukangas, “The impact of procurement digitalization on supply chain resilience: empirical evidence from Finland,” Supply Chain Manag., vol. 28, no. 7, pp. 62–76, 2023, doi: 10.1108/SCM-08-2022-0312.
2. S. Herold, J. Heller, F. Rozemeijer, and D. Mahr, “Dynamic capabilities for digital procurement transformation: a systematic literature review,” Int. J. Phys. Distrib. Logist. Manag., vol. 53, no. 4, pp. 424–447, 2023, doi: 10.1108/IJPDLM-12-2021-0535.
3. E. Peters, L. Knight, K. Boersma, and N. Uenk, “Organizing for supply chain resilience: a high reliability network perspective,” Int. J. Oper. Prod. Manag., vol. 43, no. 1, pp. 48–69, 2023, doi: 10.1108/IJOPM-03-2022-0167.
4. Y. Yu, L. Xu, and X. Wen, “The Impact of Digital Transformation on Supply Chain Resilience in Manufacturing: The Mediating Role of Supply Chain Integration,” Sustainability, vol. 17, no. 9, p. 3873, Apr. 2025, doi: 10.3390/su17093873.
5. C. Cordon, “The Surprising Developments of Digital Supply Chains to Raise Resilience in the Face of Disruptions,” no. 1383, 2023, [Online]. Available: https://www.adb.org/publications/the-surprising-developments-of-digital-supply-chains-to-raise-resilience-in-the-face-of-disruptions
6. W. Yin and W. Ran, “Supply Chain Diversification, Digital Transformation, and Supply Chain Resilience: Configuration Analysis Based on fsQCA,” Sustainability, vol. 14, no. 13, p. 7690, Jun. 2022, doi: 10.3390/su14137690.
7. M. A. Salam and S. Bajaba, “The role of supply chain resilience and absorptive capacity in the relationship between marketing–supply chain management alignment and firm performance: a moderated-mediation analysis,” J. Bus. Ind. Mark., no. September, Oct. 2022, doi: 10.1108/JBIM-02-2022-0105.
8. A. A. A. Ali, A. A. S. Fayad, A. Alomair, and A. S. Al Naim, “The Role of Digital Supply Chain on Inventory Management Effectiveness within Engineering Companies in Jordan,” Sustainability, vol. 16, no. 18, p. 8031, 2024, [Online]. Available: https://www.mdpi.com/2071-1050/16/18/8031
9. S. Zhang, Q. Yu, S. Wan, H. Cao, and Y. Huang, “Digital supply chain: literature review of seven related technologies,” Manuf. Rev., vol. 11, 2024, doi: 10.1051/mfreview/2024006.