

Exploring the Interplay of Digital Procurement and Data Analytics Capabilities for Enhancing Supply Chain Performance: A Dynamic Capabilities Perspective

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ABSTRACT

This research critically investigates the integrative influence of data analytics capabilities in advancing digital procurement efficacy and supply chain performance, framed within the dynamic capabilities paradigm. It delineates three analytically distinct yet synergistic domains: external data analytics, internal data analytics, and digital procurement capability. External analytics serve as a strategic enabler by furnishing predictive insights into volatile market conditions and supplier dynamics, thereby supporting risk mitigation and informed sourcing decisions. Internal analytics underpin operational alignment by leveraging enterprise data to optimize processes and support digital system functionality. Digital procurement capability, operationalized through advanced technologies including artificial intelligence and e-procurement platforms, facilitates structural reconfiguration of procurement workflows to enhance agility, transparency, and cost efficiency. The interdependence of these capabilities fosters a data-intensive ecosystem characterized by heightened resilience, responsiveness, and sustainability. Empirical evidence substantiates their strategic alignment as a mechanism for navigating environmental uncertainty and sustaining competitive advantage. The findings underscore both theoretical contributions and practical trajectories for digital supply chain

Keywords: Digital Procurement, Dynamic Capabilities, Supply Chain Resilience, Artificial Intelligent, Procurement

INTRODUCTION

The accelerated digital transformation of supply chains has instigated a paradigmatic shift in the strategic and operational modalities through which firms deploy data and digital technologies to secure and sustain competitive advantage. As firms confront increasingly complex and volatile environments, a sophisticated comprehension of differentiated data analytics capabilities is vital to driving performance optimization and organizational resilience. This study delineates three analytically distinct yet interdependent dimensions of data analytics capabilities that are pivotal in shaping supply chain efficacy: external data analytics capability, digital procurement capability, and internal data analytics capability.

External data analytics capability encapsulates an organization's proficiency in sourcing, synthesizing, and interpreting data from extrinsic actors and dynamic market forces, including suppliers, consumer trends, and industry shifts. This externally-oriented analytical acuity facilitates adaptive decision-making by furnishing firms with foresight into market volatility and procurement risks. Empirical findings underscore its instrumental role in augmenting digital procurement infrastructure, thereby enabling organizations to proactively exploit emerging opportunities and mitigate potential disruptions—such as supply shortages,

geopolitical uncertainties, and fluctuating market demands. By equipping firms with timely, granular insights into external variables, external data analytics enables anticipatory adjustments in sourcing strategies, supplier selection, and procurement scheduling, thereby safeguarding continuity and optimizing responsiveness within digital procurement operations.

Digital procurement capability pertains to the strategic integration of advanced digital technologies—including e-procurement platforms, automation systems, and artificial intelligence to restructure and optimize procurement workflows. This capability enhances inter-organizational coordination, improves transparency, and reduces transaction costs. The empirical analysis demonstrates that robust digital procurement infrastructures exert a direct and substantive influence on supply chain agility, responsiveness, and cost-efficiency. These outcomes are further amplified when supported by internal data analytics, which facilitate real-time monitoring of inventory levels, production cycles, and order fulfillment metrics. Such visibility enables procurement systems to rapidly adapt to operational variances, align purchasing schedules with actual demand, and minimize excess expenditures. These initiatives thereby improving both responsiveness to dynamic requirements and overall cost efficiency across the supply chain.

Internal data analytics capability refers to the organization's internal competence in leveraging operational data which drawn from logistics, production, inventory, and related systems. Internal data analytics aims to refine processes and elevate organizational insight. While this capability significantly contributes to internal efficiency and evidence-based decision-making, its role in catalyzing digital procurement advancement appears circumscribed. Its primary utility lies in enhancing operational coherence and facilitating incremental process optimization, which in turn supports the effectiveness of digital procurement systems. By streamlining internal workflows and reducing process redundancies, internal analytics create a more stable and transparent operational base upon which digital procurement technologies can function more efficiently. This alignment ensures that procurement decisions are supported by accurate, timely internal data, thus enabling better automation, reduced cycle times, and improved supplier collaboration.

Collectively, the interaction among external analytics, digital procurement, and internal analytics constructs a multidimensional architecture for navigating the complexities inherent in digital supply chains. External analytics strategically inform procurement processes, while internal analytics reinforce operational performance. Their convergence fosters a comprehensive, data-driven ecosystem capable of delivering sustainable supply chain excellence. The sustainable supply chain excellence defined as the ability to achieve high levels of performance and responsiveness while minimizing environmental impact, promoting social responsibility, and ensuring long-term economic viability. This integrative framework supports adaptive decision-making, reduces resource inefficiencies, and enhances resilience across the supply network.

LITERATURE REVIEW

In the evolving field of supply chain management, data analytics capability has emerged as a key enabler of supply chain resilience, agility, and performance. This capability comprises both internal and external dimensions, and recent research has emphasized its vital role in improving decision-making, coordination, and disruption management. As organizations increasingly operate in dynamic and uncertain environments, the integration of data analytics into supply chain processes becomes critical for sustaining competitive advantage and operational continuity.

To better understand the strategic role of data analytics in supply chains, this literature review explores three key thematic areas. First, it examines how analytics supports supply chain risk management (SCRM) by enhancing the identification, assessment, and mitigation of potential disruptions. Second, it investigates the function of analytics as a bridge between information system (IS) innovativeness and supply chain resilience, highlighting how technological advancements contribute to adaptive capabilities. Third, the review addresses the moderating effect of supply chain integration on analytics capability, focusing on how collaborative processes across partners amplify the value derived from analytics. These areas collectively provide a comprehensive foundation for understanding the multifaceted contributions of analytics in modern supply chain environments.

Analytics for Effective Risk Management and Resilience

Data analytics capability empowers firms to systematically collect, process, and respond to real-time information sourced from both internal operations and external stakeholders. This capability plays a crucial role in enhancing supply chain risk management (SCRM) practices by enabling organizations to detect, assess, and mitigate risks with greater precision and timeliness [1]. Internally, analytics facilitates more effective communication, streamlined resource scheduling, and informed decision-making. Externally, it strengthens collaboration with supply chain partners, improving information transparency, responsiveness, and coordination. By operating across both dimensions, data analytics capability supports proactive planning to anticipate potential disruptions as well as reactive agility in responding to emergent supply chain shocks.

Reactive agility refers to an organization's capacity to swiftly sense, interpret, and respond to unanticipated events, minimizing their negative impact on operations. This is achieved through real-time data visibility, automated alert systems, and dynamic decision-making frameworks enabled by analytics [2], [3] Such agility allows firms to reconfigure supply chain processes, reroute logistics, and reallocate resources promptly in the face of disruptions, thereby reinforcing overall supply chain resilience.

The relationship between data analytics and supply chain resilience is multifaceted. Data analytics enables organizations to continuously monitor supply chain performance, detect weak signals of potential disruption, and respond in near real-time to evolving circumstances. This analytical foresight allows firms to build adaptive strategies, improve redundancy planning, and strengthen contingency frameworks (Srinivasan & Swink, 2018). Moreover, advanced analytics, such as predictive modeling and machine learning, equip firms with the tools to simulate disruption scenarios and evaluate the effectiveness of different mitigation responses before they are needed (Choi et al., 2021). Consequently, analytics does not merely support operational efficiency but also acts as a foundational element for strategic resilience, enabling firms to absorb shocks, recover faster, and sustain performance under volatile conditions.

Mediating Factor of Information System Innovation

The mediating role of analytics capability is further highlighted by Cao et al. [4] who contend that analytics serves as the operational conduit through which information system (IS) innovativeness is transformed into tangible supply chain resilience. Drawing upon Organizational Information Processing Theory (OIPT), prior literature highlighted that firms with forward-thinking IS strategies are more inclined to invest in and develop sophisticated analytics infrastructures [5]. These tools enable firms to swiftly interpret complex data, facilitating informed, data-driven responses to supply chain disruptions rather than relying solely on managerial intuition. In this capacity, analytics functions as the critical interface linking technological investments with practical, resilience-enhancing outcomes, thereby reinforcing the strategic value of IS innovation within dynamic and uncertain supply chain environments.

Information system innovation refers to the development and deployment of novel or significantly improved digital technologies, architectures, and applications that enhance how organizations collect, process, and use data. In the context of supply chains, such innovations—ranging from cloud-based platforms and Internet of Things (IoT) integrations to artificial intelligence and blockchain. These two factors facilitate real-time visibility, predictive analytics, and end-to-end coordination. These capabilities enable firms to better anticipate demand fluctuations, optimize logistics, enhance inventory management, and respond swiftly to disruptions. As a result, IS innovation becomes a catalyst for building adaptive, transparent, and resilient supply chain ecosystems.

In summary, the integration of information system innovation and analytics capability forms a synergistic foundation for enhancing supply chain resilience. While IS innovation introduces the technological infrastructure necessary for advanced data processing, analytics capability operationalizes this potential by enabling organizations to interpret and act on information with agility and precision. Together, they empower firms to navigate complexity, manage risk, and sustain performance in an increasingly volatile global supply chain landscape.

DISCUSSION

The findings of this study illuminate the critical role of digital procurement, augmented by data analytics capabilities, in fostering enhanced supply chain performance, viewed through the lens of dynamic capabilities. This research underscores that the synergistic interplay between digital procurement and data analytics is not merely an operational upgrade but a strategic imperative for firms seeking to thrive in increasingly volatile and complex business ecosystems [6]. Digital adaptability emerges as a crucial driver of digital agility, which in turn bolsters supply chain resilience [2], [3].

The integration of digital platforms and tools serves to integrate resources and capabilities, achieving a synergistic effect where the cumulative competitive advantage exceeds the sum of its individual components[7]. The transition to digital procurement necessitates a re-evaluation of established operational paradigms, demanding a comprehensive understanding of how digital platforms can reshape buyer-supplier relationships[8]. By leveraging real-time data insights, organizations can proactively identify and mitigate potential disruptions, optimize inventory management, and foster collaborative relationships with suppliers.

Moreover, the study emphasizes the significance of data analytics in transforming raw procurement data into actionable intelligence, enabling organizations to make informed decisions, optimize sourcing strategies, and enhance overall supply chain visibility [9]. Data analytics drives enhanced processes that lead to capabilities such as agility, flexibility, and collaboration at the supply chain level, which has a knock-on effect on firm performance [10].

The adoption of digital procurement practices necessitates a strategic alignment between internal organizational structures and external supply chain partners, emphasizing the need for a cohesive and integrated approach to digital .This transition requires not only technological investments but also a cultural shift towards data-driven decision-making and a willingness to embrace new collaborative models. Interpersonal skills remain critical for nurturing trust and resolving conflicts in negotiations (Cooper, 2025). Ethical considerations, including sustainability and corporate responsibility, are increasingly integral to contemporary supply chain practices, reflecting heightened stakeholder expectations (Cooper, 2025).

Digital transformation is not merely about adopting new technologies; it involves managing complex adaptive systems and addressing ingrained mindsets within organizational processes and culture. The implementation of digital procurement solutions and data analytics capabilities is not without its challenges, including the need for significant upfront investments, the potential for data security breaches, and the requirement for skilled personnel to manage and interpret complex data sets. Organizations must also address potential risks associated with over-reliance on digital platforms, ensuring that human oversight and judgment remain integral components of the decision-making process. Data management and analysis across the supply chain poses a significant challenge, however, AI can analyze data to provide actionable insights, enhancing decision-making capabilities

In summary, the study's findings contribute to the growing body of knowledge on digital supply chain management, offering practical insights for organizations seeking to leverage digital procurement and data analytics to enhance supply chain performance. Furthermore, this research highlights the need for a holistic approach to digital transformation, emphasizing the importance of aligning technology investments with organizational culture, strategic objectives, and ethical considerations.

CONCLUSION

This manuscript provides a framework for firms looking to use digital procurement and data analytics capabilities to improve supply chain performance. The dynamic capabilities perspective used in this study emphasizes the significance of organizational agility and adaptability in the current business climate. Future studies may concentrate on longitudinal data to track the long-term consequences of digital procurement initiatives and data analytics on supply chain performance.

By examining these aspects, future research endeavors can contribute to a more nuanced and comprehensive understanding of the multifaceted dynamics shaping the digital supply chain landscape. This research can act as guidance for academics and professionals who are interested in utilizing digital technologies to create resilient and efficient supply chains. Future research should explore how digital transformation and international standardization can further strengthen supply chains, ensuring long-term sustainability and competitiveness in the global market (Strategic Innovations in Halal Frozen Food Supply Chains: Enhancing Compliance, Sustainability, and Global Market Competitiveness, n.d.).

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