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Managerial and Organizational Transformation in the Digital Supply Chain Ecosystem: The Impact of Technologies on Decision-Making and Collaboration

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Abstract

Purpose: This study aims to examine the transformative effects of digital technologies on managerial decision-making and organizational collaboration in supply chain management. While existing literature often focuses on operational efficiency, this study emphasizes the managerial and organizational dimensions of digital transformation.

Method: A narrative literature review was conducted using academic sources published between 2010 and 2025. A thematic analysis approach was applied to identify key patterns and concepts.

Findings: Four main themes emerged: (1) transformation in digital decision-making processes, (2) digital integration in organizational collaboration, (3) changes in leadership and competency requirements, and (4) organizational alignment within digital ecosystems. Strategic concepts such as data-driven decision-making, e-leadership, platform-based collaboration, and organizational agility were found to be crucial in digital supply chain contexts. The study emphasizes that digital transformation is not only technological but also requires cultural and structural change.

Implications for Research and Practice: The study provides a conceptual foundation for future research and offers insights for managers seeking to adapt to digital supply chain ecosystems. It underlines the importance of leadership, agility, and collaborative infrastructure in ensuring effective digital transformation.

Keywords: Digital transformation, supply chain, decision-making, collaboration, agility

Dijital Tedarik Zinciri Ekosisteminde Yönetsel ve Örgütsel Dönüşüm: Teknolojilerin Karar Alma ve İş Birliği Üzerindeki Etkisi

Öz

Amaç: Bu çalışma, dijital teknolojilerin tedarik zinciri yönetiminde yönetsel karar alma ve organizasyonel iş birliği üzerindeki dönüştürücü etkilerini incelemeyi amaçlamaktadır. Mevcut literatür genellikle operasyonel verimlilik üzerinde yoğunlaşırken, bu çalışma dijital dönüşümün yönetsel ve örgütsel boyutlarına vurgu yapmaktadır.

Yöntem: 2010 ile 2025 yılları arasında yayımlanmış akademik kaynaklar kullanılarak narratif bir literatür taraması gerçekleştirilmiştir. Tematik analiz yaklaşımı uygulanarak temel desenler ve kavramlar belirlenmiştir.

Bulgular: Dört ana tema ortaya çıkmıştır: (1) dijital karar alma süreçlerinde dönüşüm, (2) organizasyonel iş birliğinde dijital entegrasyon, (3) liderlik ve yetkinlik gereksinimlerindeki değişim ve (4) dijital ekosistemlerde örgütsel uyum. Veri odaklı karar alma, e-liderlik, platform tabanlı iş birliği ve örgütsel çeviklik gibi stratejik kavramların dijital tedarik zinciri bağlamında kritik öneme sahip olduğu bulunmuştur.

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Çalışma, dijital dönüşümün yalnızca teknolojik bir süreç olmadığını, aynı zamanda kültürel ve yapısal değişimi de gerektirdiğini vurgulamaktadır.

Araştırma ve Uygulama İçin Çıkarımlar: Çalışma, gelecekteki araştırmalar için kavramsal bir temel sunmakta ve dijital tedarik zinciri ekosistemlerine uyum sağlamayı amaçlayan yöneticilere önemli içgörüler sağlamaktadır. Etkili bir dijital dönüşümün sağlanmasında liderlik, çeviklik ve iş birliğine dayalı altyapının önemini vurgulamaktadır.

Anahtar Kelimeler: Dijital dönüşüm, tedarik zinciri, karar alma, iş birliği, çeviklik

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Introduction

Digitalization does not merely refer to the integration of technological tools into businesses; rather, it signifies a multilayered transformation that spans business models, organizational structures, decision-making processes, and collaboration systems (Westerman, Bonnet & McAfee, 2014). In this context, digital transformation has led to a radical restructuring in the field of supply chain management (SCM). While traditional supply chains relied on the physical tracking of material and information flows, today's digitally supported systems have evolved into structures based on real-time data management, AI-assisted decision-making, and multi-stakeholder interaction (Tao et al., 2018).

The digital technologies brought by Industry 4.0—such as the Internet of Things (IoT), big data analytics, digital twins, and artificial intelligence—affect not only the operational efficiency of supply chains but also their strategic managerial decisions (Ivanov et al., 2019). In this regard, digitalization enhances organizational flexibility and improves the speed and accuracy of decision-making processes while also strengthening transparency, predictability, and resilience in supply chain networks (Wamba et al., 2015). Decision-making is no longer based solely on past experience but increasingly supported by proactive analytics enabled by tools such as data mining and machine learning (Dubey et al., 2021).

Similarly, collaboration processes have been reshaped by digital transformation, shifting from traditional hierarchical structures to more horizontal, multi-stakeholder, and platform-based models. Especially with blockchain and cloud-based systems, trust-based information sharing among supply chain actors—including manufacturers, suppliers, logistics providers, and customers—has become easier, enabling more synchronized decision-making (Kamble, Gunasekaran & Gawankar, 2020). In this sense, digitalization is not only a technological evolution but also a structural transformation in organizational behavior, culture, and leadership practices.

Although the literature includes numerous studies on the operational outcomes of digital supply chain applications (e.g., cost reduction, speed enhancement), the impact of this technological transformation on managerial decision-making structures and organizational collaboration remains relatively underexplored (Srai & Lorentz, 2019). However, for digital transformation to be effective, in addition to technological investments, elements such as managerial flexibility, data literacy, digital leadership, and strategic alignment must also be designed holistically (Horlacher & Hess, 2016).

To address this gap, the present study conceptually examines the effects of digital technologies on decision-making and collaboration processes within the supply chain ecosystem from a management and organizational perspective. Accordingly, the main research question of the study

is:

"How do digital technologies transform decision-making and collaboration processes in the supply chain ecosystem from a management and organizational perspective?"

To answer this question, a comprehensive academic literature review was conducted, and the effects of digitalization on decision-making structures and collaboration dynamics were analyzed using thematic analysis. By focusing not only on technical transformation but also on organizational and managerial adaptation processes, the study aims to contribute to the literature at both theoretical and practical levels.

Conceptual Framework

The Digital Supply Chain Ecosystem

The digital supply chain ecosystem goes beyond the physical flow of products; it is a fully integrated system based on data, information, and technology-driven operations. This structure defines a multi-layered and multi-actor organizational model in which digital technologies play a guiding role at every stage—from production to the end user (Ivanov, Dolgui & Sokolov, 2019). The integration of physical, digital, and informational flows in digital supply chains enhances not only visibility but also dynamism, flexibility, and resilience (Tao et al., 2018).

This integration is enabled by technologies such as IoT devices, cloud-based systems, digital twins, blockchain, artificial intelligence, and big data analytics. For instance, a warehouse equipped with IoT can monitor product location and environmental data like temperature in real time, reducing spoilage risks and thereby increasing both customer satisfaction and resource efficiency (Ben-Daya, Hassini & Bahroun, 2019). Similarly, digital twin technologies create virtual models of physical systems, supporting decision-making through simulations and enabling supply chain optimization (Grieves & Vickers, 2017).

By centering data-driven decision-making, the digital supply chain enhances predictability and responsiveness. Big data analytics supports critical strategic decisions such as demand forecasting, supplier performance monitoring, and preemptive risk scenario modeling (Wamba et al., 2015). These capabilities provide not only operational but also strategic competitive advantage.

The success of such systems depends not only on technological capacity but also on system integrity and digital compatibility. The secure, rapid, and interoperable sharing of data among organizations directly affects both the efficiency and sustainability of these systems (Srai & Lorentz, 2019). Therefore, the digital supply chain ecosystem requires not just technical infrastructure but also cultural, managerial, and strategic alignment.

Organizational and Managerial Restructuring

To manage digital supply chain systems effectively, organizations must be redesigned structurally and culturally. This transformation can be examined in three dimensions: (1) automation and data orientation in decision-making mechanisms, (2) digitalization of leadership structures, and (3) embedding organizational agility in digital foundations.

Automation and Data Orientation in Decision-Making

Today, decision-making processes are increasingly based on algorithms, machine learning models, and decision support systems. Especially in dynamic and complex environments like supply chains, this structure enables managers to make faster, more precise, and comprehensive decisions (Dubey et al., 2021). Traditional experience- or intuition-based decision-making is being replaced by data analytics and scenario modeling-based scientific methods.

In this context, managers' digital competencies, data literacy, and adaptability to technology play a decisive role in the success of digital supply chain processes. Real-time data-enabled ERP systems provide management tools based on the present rather than historical performance (Wamba et al., 2015). Thus, digitalization is not only transforming processes but also fundamentally reshaping organizational decision-making culture.

Digitalization of Leadership Structures

Digital transformation in the supply chain ecosystem influences not only operations but also leadership. The concept of e-leadership, developed by Avolio and Kahai (2003), refers to a new leadership model that includes managing digital tools effectively, building trust, maintaining communication, and ensuring coordination. In digitally transformed organizations, leaders are expected to coordinate virtual teams, communicate transparently through digital platforms, and guide employees remotely.

Hence, it is not enough for a leader to be tech-savvy; they must also possess competencies such as emotional intelligence, intercultural communication, and ethical responsibility (Strielkowski et al., 2022). Digital leadership plays a critical role in guiding change, managing resistance, and increasing employee engagement during digital transformation processes.

Digital Foundations of Organizational Agility

The success of digital supply chains is closely linked to organizational agility. Agile organizations can adapt quickly to change, continuously optimize processes, and maintain high learning capacity (Cegarra-Navarro et al., 2016). Through digital technologies, organizations can accelerate decision-making, provide flexible solutions closer to the customer, and become more resilient to supply chain risks.

Agility has emerged as a key capability that ensures business survival during global crises such as pandemics. Ivanov and Dolgui (2020) highlight that digital twin-supported supply chain systems enhance the capacity to respond swiftly in crisis scenarios, thereby strengthening organizational resilience.

In conclusion, the digital supply chain is not merely a technological investment; it must be addressed holistically, including the organization's decision-making culture, leadership approach, and structural flexibility. Throughout this transformation, organizations must not only invest in technology but also foster a human-centered, learning-oriented, and adaptive culture.

Method

This study adopted a narrative literature review methodology to examine the managerial and organizational transformation within the digital supply chain ecosystem in depth. Compared to systematic reviews, narrative reviews offer a more flexible and interpretive approach. This method is particularly useful for developing conceptual frameworks, identifying theoretical trends, and synthesizing existing knowledge to generate new perspectives (Snyder, 2019; Webster & Watson, 2002).

Nature of the Approach

Narrative literature reviews allow for the critical, theoretical, and thematic analysis of existing studies based on a specific research question. Rather than collecting empirical data, this method aims to derive theoretical insights from previously published academic sources (Okoli & Schabram, 2010). Accordingly, the main objective of this study is to conceptually assess the impact

of digital technologies on decision-making and collaboration processes in supply chain management through an interdisciplinary lens.

Data Sources and Literature Search

The literature review was conducted using five major academic databases recognized for their credibility and relevance in management, organization, business, and engineering disciplines:

- Scopus
- Web of Science (WoS)
- Emerald Insight
- ProQuest
- EBSCOhost

These databases were selected due to their comprehensive and reliable content in the fields of digital transformation, supply chain management, organizational structure, and technology-driven management research.

To ensure currency, the literature base was updated to include recent publications from 2024–2025 retrieved during the article's revision phase, reflecting the most up-to-date developments in digital transformation and supply chain management.

Keywords and Selection Criteria

The following keywords were used during the literature search in alignment with the thematic structure of the study:

- "Digital Supply Chain Management"
- "Organizational Change and Digitalization"
- "Technology and Decision-Making"
- "Digital Collaboration"
- "Smart Supply Networks"
- "Digital Twin in Supply Chains"
- "AI-based Decision Support Systems"
- "E-Leadership in Supply Chain Management"

These keywords were searched in both titles and abstracts, and relevant academic journal articles, book chapters, and review papers were included in the analysis. The search was limited to English and Turkish publications released between 2010 and 2025, thus allowing the examination of the digitalization wave's impact on supply chains over a 15-year period.

The selected studies were evaluated based on the following inclusion criteria:

- Focus on the impact of digital technologies on supply chain management
- Inclusion of concepts such as decision-making, leadership, organizational structure, and collaboration
- Provision of conceptual or theoretical contributions
- Publication in peer-reviewed academic journals

In contrast, studies focusing solely on operational processes without addressing organizational dimensions were excluded from the analysis.

Data Analysis Process

The collected literature was analyzed using thematic analysis. The information extracted from the literature was classified into four main thematic axes:

1. The structure of the digital supply chain ecosystem
2. Transformation in decision-making mechanisms
3. Changes in organizational leadership models
4. Collaboration and multi-stakeholder governance processes

Within each theme, the prominent theoretical approaches, model proposals, and empirical findings were analyzed comparatively. Furthermore, each study was categorized based on the technological infrastructures it addressed (e.g., digital twins, AI, IoT), enabling a multi-dimensional analysis that considered both conceptual scope and technology-based distinctions.

Reliability of the Method

To enhance the reliability of the method, the literature retrieved from different databases was cross-verified. In addition, comparisons were made with existing systematic reviews in the field (e.g., Dubey et al., 2021; Kamble et al., 2020) to identify both overlapping and diverging points, thereby clarifying the unique contributions of this study to the existing body of literature.

Although the narrative literature review method provides a flexible and interpretive framework, it also carries certain limitations. Since it does not follow a systematic data collection protocol, some relevant studies may have been unintentionally overlooked. Nevertheless, cross-verification across multiple databases and comparison with existing systematic reviews were conducted to mitigate this limitation.

Findings

The thematic analysis conducted in this study identified four main themes related to the managerial and organizational transformation processes emerging in the digital supply chain ecosystem. Each theme explains a multidimensional aspect of how digitalization affects supply chain management.

These themes are:
(1) Transformation in digital decision-making processes,
(2) Digital transformation in organizational collaboration,
(3) Changes in leadership and competency requirements, and
(4) Organizational alignment in digital ecosystems.

Transformation in Digital Decision-Making Processes

With digital transformation, decision-making in supply chains has undergone a fundamental shift. While traditional mechanisms relied on past experiences and intuition, today's systems integrate technologies such as data analytics, artificial intelligence (AI), and machine learning (ML) to support faster, more accurate, and strategic decisions (Wamba et al., 2015).

AI-based decision support systems enable a proactive approach across all stages of the supply chain, providing predictive insights into demand forecasting, order scheduling, route planning, and

capacity utilization. Dubey et al. (2021) highlight that big data analytics positively influences supply chain agility, enhancing firms' adaptability in uncertain environments.

Algorithmic forecasting and scenario-based modeling assist in strategic planning by helping managers identify risks in advance. Digital twin technologies further this process by creating virtual simulations of physical systems, allowing decision-makers to assess the outcomes of "what-if" scenarios (Grieves & Vickers, 2017).

Moreover, these technologies have enabled a shift from hierarchical structures to horizontal data-sharing models. Decision-making is no longer restricted to top management but is becoming decentralized, empowering digitally equipped departments to act autonomously, thus enhancing internal coordination and operational speed.

Digital Transformation in Organizational Collaboration

Digital transformation has also led to significant changes in external stakeholder relationships. Digital platforms, cloud computing, and blockchain technologies have enabled more integrated and sustainable connections between manufacturers, suppliers, logistics providers, and customers (Kamble et al., 2020).

Through shared platforms, information on inventory levels, delivery times, and order statuses can be accessed in real time, reducing information asymmetries and supply chain disruptions (Ben-Daya, Hassini & Bahroun, 2019). For example, Amazon shares logistics, sales, and stock data with its suppliers to enable synchronized planning.

The rise of platform economies has made collaboration more scalable and digitally mediated. Many actors now engage in global markets through decentralized digital platforms, increasing the need for data-driven collaboration and technological adaptation.

Blockchain-based data exchanges enhance trust and transparency, minimizing risks like counterfeiting, supplier non-compliance, and unsustainable practices (Tijan et al., 2021). Thus, digital collaboration is not only a technical but also an ethical and legal advancement.

Changing Leadership and Competency Requirements

Digital transformation has fundamentally altered leadership paradigms. It reshapes not only operations but also employee expectations, communication styles, and organizational culture. Digital leadership, as proposed by Avolio and Kahai (2003), is a multidimensional model combining technological expertise with empathy, adaptability, and change management skills.

This leadership model is especially relevant in remote and hybrid work settings, where leaders must build trust, maintain communication, and provide direction in uncertain environments (Northouse, 2021). Strielkowski et al. (2022) argue that digital leaders play a crucial role in offering psychological and strategic support through digital tools during crises.

Managing remote teams requires leaders to collaborate not only with team members but also with technological systems. The complexity of virtual environments highlights the importance of emotional intelligence, transparency, and intercultural sensitivity. Digital leadership now intersects with transformational and servant leadership approaches (Bartel et al., 2012).

Organizational Alignment in Digital Ecosystems

Effective management of digital supply chains requires not only technological integration but also alignment with organizational culture, structure, and processes. Organizational alignment refers to the firm's ability to demonstrate flexibility, agility, and resilience in response to change (Cegarra-Navarro et al., 2016).

Agile structures that adapt continuously to change provide competitive advantages, especially during crises. Ivanov and Dolgui (2020) argue that digital twins and scenario planning improve an organization's ability to develop contingency strategies and strengthen resilience. Agility encompasses not only technical adaptation but also human engagement.

Resistance to technological change—driven by job security concerns, insufficient training, or fear of complexity—remains a barrier (Horlacher & Hess, 2016). Therefore, change management must address both technical systems and human transformation.

Organizational alignment must be approached multidimensionally: technical (infrastructure), cultural (beliefs and values), cognitive (awareness and knowledge), and structural (roles and processes). Managing all these dimensions together is critical for sustainable digital transformation.

Discussion

The Impact of Technology on Decision-Making and Collaboration

Digital technologies are transforming traditional management models by enabling data-driven, automated, and rapid decision-making. Tools such as AI, ML, big data analytics, and decision support systems allow managers to make forward-looking strategic decisions rather than relying solely on past experiences (Jarrahi, 2018; Provost & Fawcett, 2013).

In collaboration, platform technologies, cloud-based models, and blockchain enhance real-time synchronization between supply chain actors. Blockchain in particular reinforces trust, while platform economies create multi-stakeholder environments for digital interaction (Iansiti & Lakhani, 2017; Casino et al., 2019).

Practical examples further demonstrate how digital transformation reshapes supply chain management. For instance, Siemens employs digital twin technologies for predictive maintenance and real-time optimization, while Amazon integrates big data analytics and IoT-based systems for synchronized logistics. Similarly, Maersk utilizes blockchain platforms to ensure transparency and traceability in maritime supply chains. These practices exemplify how global firms align managerial decision-making and collaboration through digital ecosystems.

Emerging Debates in the Management Literature

Digital supply chains open new theoretical discussions beyond operational efficiency. Theories such as systems theory, complex adaptive systems, and agile organizations are increasingly used to explain the multidimensional nature of digital ecosystems (Vial, 2019; Weill & Woerner, 2015).

As organizational boundaries become blurred, flexibility, resilience, and digital maturity become key determinants of adaptability to environmental changes. This connects the concepts of organizational resilience and digital capability within the management literature (Teece et al., 2016).

E-Leadership and Organizational Commitment

In digital environments, leadership shifts from physical interaction to digital engagement, conceptualized as e-leadership. E-leaders guide teams through technology, build trust, and foster a sense of belonging (Avolio et al., 2014). Studies show that e-leadership enhances employee commitment and motivation (Contreras et al., 2020).

However, digital isolation risks require e-leaders to possess strong communication and emotional intelligence skills (Bartel et al., 2012). In this context, commitment in digital supply chains is influenced not only by technological infrastructure but also by the leader’s emotional support capacity.

The Intersection of Strategic Alignment, Agility, and Learning

Digital transformation reshapes organizations structurally and culturally. Strategic alignment, agility, and organizational learning now operate in unison. Tallon and Pinsonneault (2011) found that IT alignment significantly determines organizational agility, which enhances responsiveness to market changes.

Learning organizations adapt continuously by updating knowledge. In this context, digital supply chains function not only as technical systems but also as adaptive, learning entities (Garvin, 1993).

Limitations

This study is limited to a conceptual and narrative analysis based on secondary sources. As it does not include empirical data, the generalizability of findings across different sectors and regions may be restricted. Furthermore, despite efforts to include a wide range of studies, some relevant sources may not have been captured due to the narrative nature of the review.

Conclusion and Recommendations

This study has conceptually examined the impact of digital transformation on supply chain management from a managerial and organizational restructuring perspective. Based on thematic analysis and a comprehensive review of recent literature, it is evident that digitalization affects not only technical processes but also decision-making, collaboration, leadership, and organizational alignment.

Technologies such as big data analytics, AI, blockchain, and platform-based systems contribute to more transparent, flexible, and predictive supply chain processes. These transformations are creating data-driven, decentralized decision structures and fostering multi-stakeholder, trust-based collaboration.

The use of digital tools enables managers to make evidence-based decisions, especially under uncertainty. Collaboration becomes real-time, integrated, and transparent across all actors, encouraging a shift from hierarchical to horizontal networks.

The findings also show that leadership is evolving through digitalization. Remote working has highlighted the importance of digital leadership competencies such as empathetic communication, digital literacy, and virtual team management. E-leadership is a hybrid form combining technology with social and emotional intelligence.

Digital supply chains directly influence strategic alignment, agility, and organizational learning capacity. Technologies improve responsiveness and accelerate the learning processes, encouraging a culture of informed decision-making.

Recommendations:

For research: Further studies should integrate digital supply chains with organizational theory, leadership studies, knowledge management, and strategic alignment, using interdisciplinary approaches and empirical validation.

Future studies may adopt diverse methodological approaches such as case studies, comparative analyses, or quantitative modeling to empirically validate the conceptual relationships discussed in this study. Multi-sectoral or cross-country comparative research could further illuminate contextual variations in digital transformation dynamics.

For practice: Managers should be trained in data analytics and AI applications. Organizations must embed digital collaboration tools into business processes, redesign leadership development programs to include digital competencies, and align organizational culture with transformation

goals.

In conclusion, digital supply chain ecosystems are reshaping key business functions such as decision-making, collaboration, leadership, and strategy. Therefore, digitalization should be embraced not merely as a tool but as a comprehensive management philosophy.

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