

# Digital Transformation in Supply Chains: Consulting Strategies and Impacts

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**Abstract** - This paper investigates the transformative effects of digital transformation across various academic disciplines and practical applications, emphasizing its influence on supply chain management and digital marketing. Digital Transformation drives independent research streams, focusing on antecedents, implications, and contingencies of technological innovations. In the digital marketing era, consumers utilize advanced technologies and smart apps to evaluate products and services, prompting businesses to adopt digital transitions for understanding customer behaviors and developing strategic differentiation models. Despite the evolving literature on Digital Transformation's impact on business models, this review aims to elucidate transformations in distribution models, challenges in implementing digitized business models, and changes in revenue models post-Digital Transformation. Additionally, it explores the evolution towards Supply Chain, opportunities for new business models, and the role of generative AI in enhancing decision-making, efficiency, and sustainability. Findings from detailed case studies highlight significant improvements in performance, automation, and collaboration, underscoring the necessity of strategic adaptation for businesses to harness these advancements effectively. This review enhances the existing Digital Transformation literature in business processes, offering managers insights into Digital Transformation's necessity in business activities, opportunities, challenges, and revenue generation.

**Keywords**—Supply Chain Management ; digitization; smart network; Business Models

## I. INTRODUCTION

In today's digital age, customers adeptly use technology to instantaneously access and compare items, affecting their purchasing decisions and causing businesses to rethink their models to produce maximum value and competitive advantage (Berman, 2012). Market instability, pushed by recent technological breakthroughs, has prompted organizations to strengthen their responsiveness and integrate digital transformation into their fundamental models to boost performance and operational efficiency.

Digital technologies such as the internet and cloud-based technologies enable these changes by transforming physical goods and services into digital versions, which has major benefits (Gassmann et al., 2014). Businesses all across the world use these innovations to improve a range of company factors, such as supply chains, sales channels, products, and procedures. This promotes value creation, productivity, and better customer interactions (Downes & Nunes, 2013). Prioritization and strategic alignment of disparate threads are necessary due to the extensive reach of digitalization (Matt, Hess & Benlian, 2015).

While infrastructure applications, systems, and organizational frameworks remain the main emphasis of IT strategy, innovations aimed at meeting customer and product-centric objectives are crucial for advancing digital transformation (Teubner, 2013). According to Matt et al. (2015), Digital Transformation goals specifically target customers and overall business operations, emphasizing procedural, product, and functional innovation. Digital business strategies, which integrate IT skills with digital technologies and organizational functions, have a substantial impact on profitability, community participation, and firm performance (Bharadwaj et al., 2013; Oestreicher-Singer & Zalmanson, 2013). As demonstrated by Ford's "MyFord Touch" feature, Lego's and BMW's usage of robots and digital media, and effective Digital Transformation reconfigure customer value propositions while improving experiences and bringing in new revenue streams (Berman, 2012).

As evidenced by Best Buy's metamorphosis, Digital Transformation has also transformed supply chains, resulting in better tracking, faster order processing, and improved partnerships through improved information flow (Berman, 2012).

The influence of Digital Transformation on revenue models and distribution channels is reviewed in this study, which also looks at the difficulties in incorporating digital technology into business models and highlights some of the advantages of Digital Transformation. With the advent of new Supply Chain models, which are defined by IoT, advanced robots, and big data analytics, logistics has changed over the past thirty years from an operational to a strategic position within enterprises. Furthermore, by

generating insights from unstructured data, improving productivity, and facilitating tailored interactions, generative AI presents supply chain management with previously unheard-of possibilities. It looks at how generative AI is changing supply chain operations, revenue generation, and business models.

## II. AIMS AND OBJECTIVES

This research aims to analyze the transformative impact of digital transformation on supply chains, focusing on the evolution of revenue and distribution models, as well as the challenges organizations face during this transition. The study will investigate how Digital Transformation integration reshapes supply chain dynamics, explore the challenges of adopting digitized business models, and analyze the resulting changes in revenue generation. Furthermore, the research will delve into the emerging role of generative AI in supply chain management, examining its potential to enhance sustainability, customer-centricity, and overall efficiency, while also identifying the challenges and opportunities associated with its integration. Case studies will be employed to provide practical illustrations of these transformations and their real-world implications.

## III. LITERATURE REVIEW

### 1. Opportunity to Design New Business Models with Digital Transformation

Digital transformation in supply chains, termed Supply Chain 4.0, leverages IoT, robotics, and big data to enhance performance and customer satisfaction, enabling the integration of advanced analytics and automation. Generative AI contributes by utilizing contextualized insights from unstructured data to enhance prediction and decision-making, fostering innovative business models. As consumers increasingly use mobile devices to evaluate products instantly, firms are digitizing to better understand consumer behaviors and develop competitive models.

Examples include IRCTC's digital processes for reservations and information. In order to provide customers with more cost-effective and convenient services, IRCTC has embraced digital changes in operations including e-reservations, online hotel bookings, PNR status queries, train schedule checks, lodging availability, and tourist information (Mohapatra, 2012).

The German elevator and escalator company ThyssenKrupp experienced a high rate of elevator malfunctions, which put customers at serious risk and expense. In response, the business launched a digital program called MAX to track elevator systems and collect crucial technical and mechanical data to cut down on maintenance backlogs and enhance customer service (Schallmo, Williams, & Boardman, 2017).

Digitalization through technological means is essential for changing company paradigms. Data storage, hardware, and software are now integrated into products that are built with mechanical and electronic components (Rachinger et al., 2019).

In order to solve problems with hygiene, transparency, inventory management, and HR planning, the Austrian sanitary product manufacturer Hagleitner created a new system called Hagleitner sense Management. This system significantly increased customer satisfaction and operational efficiency (Schallmo & Williams, 2018).

Wurzer Umwelt Limited, a trash disposal and environmental protection company, implemented WEBFLEET technology to improve worker productivity, shorten training durations, and save expenses—saving between 90,000 and 100,000 euros a year (TomTom Telematics, 2017).

Studies also show that big data and social media drive business model innovation in SMEs, while digital initiatives like Dynasens enhance productivity and workplace ergonomics. Digitizing business models thus boosts entrepreneurial activity, productivity, and socio-economic benefits, highlighting the transformative potential of digital technologies in business strategies.

### 2. Challenges to Integrate Digital Transformation in Business Models

Integrating digital technologies into business models presents several challenges, including the need for sophisticated planning processes and predictive analytics to reduce forecasting inaccuracies, which necessitates a shift from traditional methods. Generative AI, while promising, brings complexities in the generated knowledge and requires expert utilization to enhance user interaction and data confidence. High investment costs, lack of knowledge, cybersecurity threats, and increased competition are significant obstacles identified in sectors like the food industry. Managers face dilemmas such as balancing customer satisfaction with operational efficiency and managing data quality and accessibility.

Smart factories, utilizing real-time communication and IoT, encounter issues like a lack of common vision among employees, rapid technological development, and data overload. Additionally, open data challenges include personal information protection, regulatory issues, and high costs of digital infrastructure. Despite these obstacles, digital transformation offers opportunities for firms to innovate and reconstruct their business techniques, enhancing operational processes, business models, and customer experiences.

The McKinsey Digital Supply Chain Compass maps Supply Chain 4.0 improvement levers to 6 main value drivers



SOURCE: McKinsey

Fig. 1. Digital Supply Chain Compass

### 3. Transforming Revenue Models and Digital Transformation

Digital transformation enables dynamic pricing and enhanced demand and supply planning, leading to significant cost reductions and efficiency gains. By adjusting revenue models in real-time based on demand predictions and stock levels, companies can optimize their operations. Generative AI further supports this transformation by creating context-specific text, code, images, and insights on a large scale. It aids sourcing, procurement, and contract renewal negotiations by providing vendor-specific data and performance metrics. Companies across various industries are leveraging internet-based digitization strategies to enhance operations.

For example, Rolls-Royce's "power-by-the-hour" model transformed its revenue approach by charging customers based on engine operational time, bypassing high fixed costs and competition from third-party service providers. Similarly, Hasbro utilized digital advertising to target parents, significantly boosting returns.

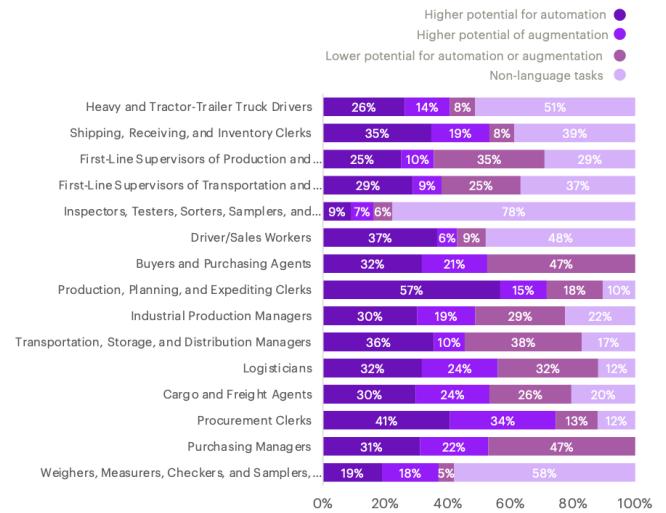
Embracing digital advancements unlocks numerous opportunities, while failure to adapt can lead to reduced profits and existential threats. Over the past decade, advancements in ICT have enhanced productivity, welfare, and economic growth while addressing inequalities. Firms must innovate and transform products and processes to sustain profitability, with business model innovation (BMI) being crucial for sustainable performance and competitive advantage.

Studies show that companies mature in digital intensity and transformation management significantly outperform their peers. Digitalization facilitates revenue generation by enabling firms to monetize consumer data and behavior. Media and entertainment companies must adapt to digital

transformation to engage customers and boost revenue, highlighting the importance of improved interaction and consumer experience for revenue enhancement.

### Work time distribution by occupation and potential LLMs impact

Ordered by their employment levels in the US in 2022



Note: Estimates are based on Human+Machine identification of work tasks exposure to impact of generative AI. Source: Accenture Research based on US BLS May 2023 and O\*Net.

### 4. Altering Supply Chains with Digitized Business Models

Effective supply chain management is crucial for long-term organizational efficiency, profitability, and competitiveness. The integration of big data and artificial intelligence, as asserted by Zhong et al. (2016) and Bucy et al. (2016), drives digital transformation in global organizations, enhancing innovation and collaboration. Digital transformation offers opportunities and challenges, requiring companies to experiment with and evaluate their supply chain futures. To maximize supply chain surplus and gain a competitive edge, firms must address internal process challenges and optimize their supply chains. Future supply chains will focus on intelligence, interconnectedness, and instrumentation to reduce costs and increase productivity. For example, real-time customer feedback from social media aids management and follow-up activities, while the Internet of Things and big data significantly modify supply chains by integrating technological advancements with customer-specific requirements.

Society's growing interest in digital technology and supply chain transparency compels organizations to align their business models with social responsibility, facilitating real-time information access and fostering trust between suppliers and customers. Real-time supply chain transparency and response speed, emphasized by Handfield (2016), will define organizational competitiveness and sustainability. Companies must

innovate their supply chains through intelligence and digital transformation to create responsive systems. Transitioning to a pull approach, which emphasizes customer participation, necessitates collaboration among supply chain partners, achievable only with robust IT support.

Digitizing business models influences capacities, processes, and capabilities. Managers and employees face challenges in aligning organizational operations with stakeholder expectations while maintaining an efficient working environment. Transparency through standardized information and resource flows, clear role definitions, and disciplined integration of new components are essential. Digital transformation impacts employees as they are the first to experience its effects. Creative industries like film, advertising, and music have struggled with digitization in distribution processes. The internet's interactive nature and mobile devices have evolved production and consumption processes, increasing market opportunities but posing challenges like ownership rights and content duplication.

Digital technologies are transforming physical logistics with automation, advanced robotics, and 3D printing reshaping warehouse operations and transportation. Autonomous vehicles and real-time data analytics enhance efficiency and reduce costs. Generative AI improves supply chain operations by automating processes, generating maintenance job plans, enhancing quality control, and facilitating real-time data analysis and failure diagnostics. Supply Chain Management applies these data, methods, and tools to address complexity and enhance supply chain speed for global competitiveness, enabling rapid and continuous adaptation.

## 5. Case Study

### 5.1 Background

Sam Walton founded Walmart in Rogers, Arkansas in 1962. Walmart was first known as "Walton's Five and a Dime. After the debut of the first store on July 2, 1962, Wal-Mart Stores, Inc. was registered. officially next year. Walmart initially focused most of its growth on rural areas to avoid direct competition with other retailers. By 1968, the Walton family owned 24 companies with sales of \$12.7 million.

Walmart is no stranger to technology and business change. Walmart, the world's largest retailer, has pushed innovation hard. Walmart has embarked on a digital transformation journey, adopting technologies that save customers time and money, changing the way the company operates.

Walmart provides tools and solutions to help other businesses with their digital transformation. The company

has deployed several cutting-edge technologies, such as a platform that uses automation, machine learning and data analytics to transform data into useful insights. In addition, Walmart has improved its mobile capabilities and increased efforts to revolutionize retail with digital tools, adding catalog, returns, bot, partner and automation capabilities.

To remain competitive, Walmart is constantly using technologies such as machine learning and cloud-based checkout and collection capabilities to provide added convenience to its suppliers and customers. The company has also delivered autonomous vehicles and drones, and has many locations where automated micro-manufacturing can take place. Walmart employees use augmented reality technology on mobile devices to read labels.

Walmart is considered one of the largest supply chain leaders in the world. They have created a number of strategies that help them beat their competitors in the price war and use cutting-edge technology such as barcodes and RFID. Cross-docking was first used in Walmart's supply chain plan. It is a practice where products are shipped directly from the manufacturer or supplier to the customer or retail chain with minimal handling or storage. 130 miles separating Walmart's delivery operations from the retailers they supply. These regional warehouses are usually located near areas with cheaper labor and cheaper transportation. Cross-docking is possible because of the ability of Walmart warehouses to ship products directly from manufacturers to Walmart stores without unloading or storing them in a warehouse. Thanks to this, the costs of transport, storage and labor are reduced.

### 5.2 Conclusion

Walmart's digital transformation journey is a testament to the value of technology adoption in the rapidly changing retail industry. Walmart has not only remained relevant, but has become a leader in digital retail by leveraging e-commerce, data analytics, multi-channel strategy and emerging technology.

## IV. FINDINGS AND DISCUSSION

Collaboration, order management, and performance management are all significantly improved by digital transformation in supply chains. Performance management is shifted from periodic assessments to continuous improvement procedures by real-time granular data. In order management, automation and real-time replanning greatly increase order accuracy and customer happiness. Improved teamwork and lower administrative costs are two benefits of enhanced collaboration made possible by supply chain clouds and end-to-end connectivity.



Surplus, generative AI is essential because it offers contextualized insights for better decision-making, streamlines customer interactions, automates maintenance and operational procedures, and provides reliable ESG data to assist sustainability initiatives. These developments result in improved client experiences, higher efficiency, and a more environmentally friendly method of supply chain management.

Businesses need to change as digital transformations become more and more essential to running their operations in the current market.

The demand for success, innovation, and high-quality performance drives IT spending. To fully capitalize on evolving technologies and their strategic implications, digital transformation entails modifying company competencies, procedures, practices, and models. Case studies like the ones from Thyssenkrupp and IRCTC show how digitization boosts economic growth and improves customer service. However, implementing digitalized business models comes with its own set of obstacles, including high prices, cybersecurity threats, and greater competition.

Digital transformation boosts net revenues in spite of these obstacles. Businesses like Hasbro and Rolls-Royce have profited from refocusing on long-term advantages and sustainable digital business models that are harder for rivals to copy. Supply networks must include artificial intelligence and big data to be competitive in the future.

A firm's viability and profitability are at risk if it cannot quickly adapt to digital advances. Through real-time information availability, aligning with societal interests in digital technology and openness improves customer-supplier interactions. Digitalization is still essential for supply chain management to remain competitive in the future, even though some businesses find it difficult to completely adopt.

## V. CONCLUSION

This study highlights the importance of digital transformation in business models, its impact on revenue structures, distribution channels, and the associated challenges. Digital transformation opens new avenues for research, with companies focusing on enhancing customer experiences and improving revenue through digitized business models. While offering significant benefits, these models also present challenges that future research should address. Effective digital transformation strategies prioritize and coordinate various business operations, with technological advancement being key to achieving maturity. Future studies should explore the role of digital support in transformation strategies and the potential of unique technologies to align with transformation goals.

In supply chain management, digital transformation offers substantial benefits in efficiency, performance, and customer satisfaction, but requires strategic planning and adaptation. Organizations must embrace advanced analytics, automation, and collaboration to fully realize the potential of Supply Chain 4.0. Generative AI has the potential to revolutionize supply chain management by creating new business models, addressing integration challenges, transforming revenue models, and enhancing supply chain processes. Its applications in sustainability and customer-centricity further demonstrate its transformative impact. Businesses leveraging generative AI can achieve operational excellence, improved decision-making, and a more sustainable future.

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