


# Chapter 10

## Digitalization of SCM in the Agriculture Industry

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### ABSTRACT

*The study examines the impact of digitization on traditional agri-food supply chains, focusing on the utilization of Industry 4.0 and the internet of things (IoT). Precision agriculture, coupled with IoT, addresses challenges in the industry, aiming to enhance productivity. Smart farming leverages drones, AI, big data, and IoT to optimize farm operations, utilizing RFID and barcodes for data collection. IoT sensors enable informed decision-making by monitoring crop conditions. AI and IoT streamline post-harvest processes, enhancing food safety and reducing waste through automation. Industry 4.0 solutions integrate big data, IoT, and mechatronics for real-time monitoring, facilitating agile supply chain management. The study extends its insights to India's agri-food supply chain digitalization, emphasizing hurdles like limited budgets, adverse weather, and farmer reluctance. It underscores cybersecurity, and environmental concerns, and advocates for government support, education, and awareness initiatives.*

### INTRODUCTION

**Understanding Supply Chain:** A supply chain is defined as “a group of three or more businesses or people directly involved in the financial, informational, and product flows from a source to a client, both upstream and downstream” (Mentzer et al. 2001). Producers, vendors, transporters, storage facilities, distributors, sellers, and even consumers collectively constitute the supply chain. Each item available in the consumer market undergoes various business-to-business transactions from its raw form to its final state. For instance, when a consumer purchases a bottle of Coca-Cola, they don't acquire it directly

DOI: 10.4018/979-8-3693-3583-3.ch010

from Coca-Cola; instead, the product goes through several intermediary stages involving Coca-Cola, wholesalers, and retailers, until it reaches the end consumer. The intermediary could be a hypermarket or a neighborhood store (Căescu and Dumitru, 2011).

**Understanding Digitalized Supply Chain:** A fully integrated use of digital technologies like blockchain, AI, and IoT to replace conventional supply chain management techniques is referred to as a “digitized supply chain.” Through real-time data sharing and analysis, it connects all stakeholders—from suppliers to consumers—and improves efficiency, visibility, and adaptability. Data analytics, automation, predictive analytics, and demand-driven operations are important components that promote flexibility, cut expenses, and make customer-focused and sustainable practices possible. It's a dynamic approach that helps modern companies stay resilient and competitive in a fast-moving, data-driven global market. These days, discussing digital supply chains would be impossible to do without bringing up the more general subject of Industry 4.0 development (Galati and Bigliardi, 2019). A new ecosystem built on the connections between and among the many functional divisions of an organization is made possible by this new paradigm. Actually, companies are changing their approaches to become more open about all aspects of their operations, including supply chain management (Seyedghorban et. al, 2020). The integration of technologies like Augmented Reality, Robotics, and Cloud Manufacturing is facilitating “smart” information sharing. Strategic initiatives involving the deployment of several technologies to enhance communication and process integration are being driven by the study of this data (Pereira et. al, 2017).

**Scope of Digitalization:** Industry 4.0 and the process of digital transformation hold the potential to evolve a fully digitized supply chain by enhancing transparency through centralized activity, as demonstrated in reference (Preindl et. al, 2020). Additionally, Industry 4.0 can profoundly influence the organization of supply chains and various sustainability-related aspects, as highlighted in reference (Machado et.al, 2020). Reference (Jabbour et. al, 2018) enumerates the ongoing challenges that require careful resolution, including the classification of Industry 4.0 technologies conducive to sustainable operations management decisions, the promotion of collaboration within supply chains, and the establishment of performance facilitators for attainable, incremental objectives. Despite being primarily rooted in production foundations, as suggested by reference (Müller et. al, 2018), Industry 4.0 still lacks comprehensive integration with supply chain management (SCM) from its perspective. Moreover, as (Manavalan and Jayakrishna, 2019) indicate, there is still a dearth of studies on the consequences of the fourth industrial revolution for supply chains. As noted in reference (Ghadge et.al, 2020), traditional supply chains need to quickly adjust in order to successfully integrate the concepts of Industry 4.0 technologies, even as businesses continuously strive to adjust to these new technologies. Only then can they hope to remain competitive in ever-changing and rapidly growing markets. In alignment with this perspective, (Scuotto et. al, 2017) argues that there is inadequate data to substantiate the notion of a digital shift concerning collaboration.

**Digitalized Agri-Food Supply Chain:** The global agricultural and food sector is highly complex, presenting challenges across various jobs, activities, and procedures. Moreover, it is becoming increasingly inefficient due to rising demands and imposed limitations, highlighting the need for innovative Agro-Food solutions. The Agro-Food sector, like many others, relies heavily on technology for both operational and decision-making processes. Stakeholders in Agro-Food include manufacturers, producers, retailers, and governmental and policy-making bodies, all of which are integral to addressing global challenges and implementing sustainable solutions (Panetto et. al, 2020).

In particular, the food supply chain might be greatly impacted by the Internet of Things (IoT), which depends on sensors to gather data. According to (Li et. al, 2015), today's food supply chain is highly complicated and scattered, with numerous stakeholders, different geographical and temporal dimensions,

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