Investigating the Factors, Challenges, and Role of Stakeholders in Implementing Industry 5.0 and Its Impact on Supply Chain Operations: A Study of the Global Agri-Food Supply Chain

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Abstract

Industry 5.0 may assist businesses to become more constructive and competitive in the global economy in the Fifith Industrial Revolution era. Therefore, a critical review of prior literature is presented in this paper to examine how industry 5.0 will impact supply chain operations within the agricultural sector. Additionally, it examines influencing factors, challenges, stakeholder roles, and recommendations identified from the literature. Industry 5.0 has multiple benefits for the agri-food sector such as improved agility, responsiveness, efficiency, productivity, precise decision-making, as well as cost-effectiveness.

Introduction

Industry 5.0 is a process of twining the twins of 'the green' and 'the digital transitions', to build a more efficient, sustainable and resilient society and economies (European Commission, 2021). The Covid 19 has further exposed the negatives of too much reliance on efficiency, innovation, technology and productivity and has made people think about sustainability, inclusivity, employability, humanistic approach, building more resilient supply chains and adopting more sustainable ways of production and balancing the needs of various flora nd faunas of the planet earth (European Commission, 2021). The emergence of digitalization and digital technologies in various sectors today has revolutionized industries in ways that have led to improved operational performance and the integration of the entire supply chain throughout. A constant fluctuation in supply demand, disruptions, or natural disasters as well as insufficient visibility to balance the supply chain has elevated the difficulties for an unstable supply chain. Integrating emergent digital technologies may contribute to creating new opportunities, principles, and a few challenges in supply chain management (Azzi et al., 2019, Oliveira-Dias et al., 2022). The emerging digital technologies have revolutionised the Industry to 4th Industrial revolution ie "Industry 4.0", thus accelerating operational performance, and leading to producing new strategies or opportunities with highly customized systems. Using Industry 4.0 technology, manufacturers can become more cost-effective, provide high-speed production with agility and flexibility, and enhance quality. (Jagtap et al.,, 2021),. Industry 4.0 is the convergence of smart manufacturing and products, and the internet of things (IoT), which provides real-time data about the production, machines, and component flow (Chauhan and Singh, 2019). As digital technologies have advanced over the last decade, industries have gained significant control over products and processes via IoT, artificial intelligence, big data analytics, 3D printing, augmented reality, and machine learning (Sahoo and Lo, 2022).

According to Hassoun et al., (2022), it is becoming more prevalent in various sectors, including the food industry, to witness the fourth industrial revolution. In addition, it is becoming increasingly important for the agri-food supply chain to make use of advanced digital technologies and to evolve into an intelligent, autonomous, and data-driven system of systems (Lezoche et al., 2020). According to the world bank report, several technologies have been observed to be promising for addressing existing constraints in the agri-food system, such as remote sensing, blockchain and IoT (The world bank, 2021). As digital technologies are introduced into diverse food systems, capturing, storing, processing, and communicating information are integrated digitally (Donaldson, 2021). Adopting digital technologies in the food industry allows one to identify ongoing and future trends and understand the consumer's intake based on nutrients, food quality, taste experiences, etc. (Chapman et al., 2021). As a result, it is critical to maintain high-quality products and to adhere to regulations strictly, and digital technologies can contribute to ensuring the standardized product to consumers. The Global Digital Agriculture Market was valued at USD 12.8 billion in 2021 and is expected to reach a value of USD 22.1 billion by the year 2028 (Vantage Market, 2021). In addition, Market analysts predict that the global market will grow at a compound annual growth rate (CAGR) of 9.6%.

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