


*Abstract*

# Analyzing Sustainability Assessment Factors Influencing Agriculture Supply Chains in the Age of Industry 4.0 <sup>†</sup>

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Industry 4.0 is paving the way toward a new age of industrial revolution, wherein new-age technologies have a humungous impact in revamping supply chains. The invention of AI, big data, and the internet of things is reshaping supply chains into highly intelligent, rational, and interconnected networks capable of prudent decision-making. The incorporation of new-age technologies has revolutionized real-time and seamless data flow and exchange, apprehensive and foresighted analysis, and coherent stakeholder collision. This transformation enables businesses to achieve complete visibility across their processes, optimize inventory control, improve product traceability, and increase satisfaction among consumers. By adopting these emerging technologies, businesses can unlock new windows of opportunities, surmount impediments, and achieve sustainable and competitive advantage in the dynamic world of supply chain management.

The agriculture sector, which is one of the oldest and most important sectors of the global economy, has also started to embrace Industry 4.0 technologies to improve its supply chain management. The agriculture industry faces a number of difficulties, such as the need for sustainable production methods, rising food consumption, and climate change. By utilizing cutting-edge technologies to boost productivity, efficiency, and sustainability in agriculture supply chains, Industry 4.0 offers a special chance to address these issues. Because Industry 4.0 technologies have the potential to revolutionize food production and distribution, they are becoming increasingly important for supply chain management in agriculture. Industry 4.0 implementation in the agri-food sector has the potential to improve inter-organizational technological systems, integrated planning and execution systems, real-time visibility, agri-good procurement, and agri-good inventory management. The agri-food sector may enhance the integration and coordination of technological systems between organizations by utilizing cutting-edge technologies like IoT, AI, and big data analytics. Despite these technologies being available and the benefits of incorporating Industry 4.0 into agriculture supply chains, the agriculture sector is facing lots of issues.

The existing literature does not offer sufficient empirical evidence regarding the implementation of Industry 4.0 technologies in agriculture supply chains. Agriculture supply chains (ASCs) appear to be deprived of this transformational reform in terms of implementation and research. Moreover, current research also overlooks various sustainability assessment factors that hinder the adoption of Industry 4.0 in the agriculture sector. This study intends to identify the sustainability assessment factors of Industry 4.0 in agriculture supply chains. This study utilizes fuzzy-Delphi and DEMATEL methodology to evaluate the interdependencies between the identified factors.



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Fuzzy-Delphi method is used to identify and finalize the factors based on the expert opinions. DEMATEL is a technique for analyzing and viewing a structural model with intricate causal relationships. Studies on supplier choice, green supply chain management, business process management, and hospitality have all made use of DEMATEL. This study discusses the DEMATEL approach, which can analyze the interdependencies between sustainability assessment elements for integrating Industry 4.0 technologies into agriculture supply chains and determine the performance effects of these aspects. Finally, this study integrates these two approaches to offer a framework for agriculture supply chain businesses and suggests a novel approach for the sustainable evaluation of Industry 4.0 technologies. Eleven specialists with a minimum of five years of expertise in their respective disciplines provided the information.

The results of this study will enable managers, practitioners, and planners to mitigate sustainability assessment factors related to Industry 4.0 more successfully, thereby promoting sustainability in the agriculture supply chains of developing nations. In terms of policy, this study can assist institutions of a particular area in understanding the degree of digitalization of current agri-cooperatives and, as a result, in better designing political instruments to promote a more sustainable environment.

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