

Chapter 3

Generative AI Effect on Circular Economy Sustainability by Mediation of Food Supply Chain Agility

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ABSTRACT

In order to comprehend how these elements support sustainable supply chain practices, this study examines the interactions between Food Supply Chain Agility (FSCA), Generative AI (GAI), and Circular Economy Sustainability (CES). Agile supply chains are better positioned to adopt sustainable practices, according to the research, which uses a mixed-methods approach and finds a substantial positive as-

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sociation between FSCA and CES. The results also demonstrate how important GAI is in promoting supply chain agility, which helps businesses become more responsive and efficient. In order to accomplish sustainable goals, the study emphasizes the significance of using cutting-edge technology and encouraging agility, providing insightful information for both managers and researchers. In the conclusion, the study advances the theoretical knowledge of sustainable supply chains and offers useful suggestions for businesses.

INTRODUCTION

In particular, the food supply chain offers a revolutionary potential to improve sustainability through the convergence of generative AI and the circular economy (Irfan et al., 2024). There is an urgent need for creative solutions that support sustainability as the world's food systems deal with hitherto unseen problems (Li et al., 2023), such as population increase and rising demand, resource depletion, and climate change (Madanaguli et al., 2024). A workable framework to deal with these problems is the circular economy idea, which places an emphasis on resource efficiency, waste minimization, and the continuing use of resources (Suali et al., 2024). The agility of food supply chains may be greatly increased by using generative AI, which can improve decision-making and optimize operations. This will promote a more sustainable method of producing and distributing food (Wu et al., 2024). Although the circular economy has its roots in early ecological economics, it really took off in the twenty-first century when sustainability became a pressing worldwide concern (Yaroson et al., 2024). The significance of technology in promoting circular practices is being more and more highlighted in empirical research, with generative AI playing a key role in enabling innovations that increase the resilience and responsiveness of supply chains (Fonsec et al., 2024). Studies have shown, for example, that AI-driven models may eliminate food waste, streamline logistics, and forecast changes in demand—all of which are consistent with the ideas of a circular economy (Akhtar et al., 2024).

The successful use of generative AI in circular economy activities within the food supply chain is hampered by a number of real-world issues, despite the technology's encouraging promise (Shafique et al., 2024). These include stakeholder opposition to change, a lack of data consistency, technical obstacles, and inadequate governmental frameworks to foster innovation (Zhang et al., 2024). Also, there are gaps in the literature that need to be filled since current research frequently ignores the precise interactions between generative AI capabilities and the circular economy (Panigrahi et al., 2023). By methodically investigating how generative AI may manage food supply chain agility and support a circular economy, this work seeks to close these

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