Conceptualizing the Synergies Between Circular Economy and Operational Excellence in the Era of Industry 5.0

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**Abstract.** Supply chains are undergoing a profound transformation, driven by sustainability imperatives, digital innovation, and evolving customer expecta- tions. Industry 5.0, with its emphasis on human-centricity, resilience, and sus- tainability, offers a new paradigm for rethinking operational models. In this con- text, the circular economy (CE) emerges as a strategic lever to enhance both en- vironmental performance and supply chain resilience. This article aims to explore the synergies between Circular Economy and Operational Excellence (OpEx) within the framework of Industry 5.0. The research methodology combines a comprehensive literature review conducted through databases with the analysis of selected case studies. Key principles, enablers, and practices were identified and synthesized to develop a conceptual framework integrating CE, OpEx, and Industry 5.0 technologies.The results demonstrate that the integration of CE prac- tices with OpEx methodologies significantly enhances supply chain sustainabil- ity, efficiency, and adaptability. Emerging technologies such as blockchain, IoT, and AI are identified as critical enablers of this integration, facilitating waste re- duction, improved resource utilization, and enhanced traceability. The adoption of circular lifecycle approaches and durable product design aligns with the sus- tainability pillar of Industry 5.0, while the human-centric dimension ensures workforce empowerment and inclusive innovation.

**Keywords:** Industry 5.0, Operational Excellence, Circular Economy, Sustaina- bility, Literature Review