LOGISTICS 4.0 AND SUSTAINABILITY: ANALYSIS OF PRACTICES, BENEFITS, AND CHALLENGES IN LOGISTICS SERVICE PROVIDERS

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Purpose: This research analyzes how the adoption of Logistics 4.0 can promote sustainability in the activities of Logistics Service Providers (LSPs) by investigating its application in intralogistics, road freight transportation, and last mile delivery.

Research Approach: To achieve this, a systematic literature review (SLR), a multiple case study with five Brazilian LSPs, and complementary interviews with seven experts in logistics and sustainability applied to logistics services were conducted. The data were analyzed using content analysis with the support of NVivo software.

Findings and Originality: The research findings demonstrate that Logistics 4.0 supports LSPs in establishing sustainable processes and business models through automation, real-time monitoring, and system integration. In transportation, Logistics 4.0 technologies are utilized for route planning, vehicle monitoring, and cargo tracking. In intralogistics, these technologies optimize material movement, inventory management, and automate repetitive tasks, resulting in improved efficiency and reduced errors. The study highlights the social, environmental, and economic benefits of these technologies, including enhanced energy efficiency, customer satisfaction, safety, and reduced greenhouse gas emissions, logistics costs, errors, and repetitive tasks. The study's originality lies in developing an empirical framework that reveals the applications, benefits, and challenges of adopting Logistics 4.0 for sustainable value creation in LSPs.

Research Impact: This study contributes to the literature on logistics field by critically reflecting on how the application of technological innovations can aid LSPs in developing a sustainable strategy, considering the complexity, challenges, and characteristics of these companies.

Practical Impact: This research provides valuable insights for logistics managers and leaders, enhancing their understanding of the benefits and challenges of implementing Logistics 4.0 technologies and improving implementation planning. It explores how Logistics 4.0 optimizes and transforms existing logistics and management systems, emphasizing the significance of a clear strategy and dedicated leadership for successful implementation. Additionally, it examines tools that improve energy efficiency, customer satisfaction, reduce emissions, lower costs, increase operational efficiency, and enhance safety, thus contributing to society.

Keywords: Smart logistics; Digital innovations; Logistics Service Providers; Industry 4.0; Sustainable Supply Chain; Sustainable Development.

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