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STRATEGIES FOR OPTIMIZING SUSTAINABLE FOOD WASTAGE MANAGEMENT

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Abstract

Food wastage is a pressing global issue, contributing to greenhouse gas emissions and resource inefficiency across the supply chain, particularly at post-consumer stages. Addressing this challenge is essential for meeting environmental and food security goals. This paper reviews circular food wastage management strategies aligned with the Sustainable Development Goals (SDGs), focusing on both prevention and valorisation. It emphasizes the 4R framework, Re-territorialisation of production, Re-vegetarianisation of diets, Re-localisation of markets, and Re-seasonalisation of consumption as systems-based approach to reduce waste and promote sustainability. A key focus of this study is the integration of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) in optimizing food wastage management. Specific applications include smart bins for waste monitoring, AI-driven supply chain forecasting, and IoT-enabled real-time data analytics to support efficient collection, sorting, and resource recovery. Methods include a comprehensive review of literature, policy analysis, and selected case studies from both developed and developing contexts. Life Cycle Assessment (LCA) and climate adaptation strategies are also evaluated to assess environmental trade-offs. Findings highlight the importance of tech-enabled, equity-driven, and context-sensitive solutions. The paper concludes with policy recommendations and a roadmap for interdisciplinary research to advance scalable and just food wastage management systems.

Key words: bioproducts, bioprocessing, food loss, food waste, food wastage valorisation.

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