

Abstract:

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The increasing generation of organic waste, coupled with the challenges of efficient waste management, has become a significant concern in urban and rural areas alike. Traditional methods, such as landfilling and incineration, often lead to environmental pollution and resource wastage. This paper presents an innovative Organic Waste Management System (OWMS) based on Operational Technology (OT) that integrates smart technologies, automation, and real-time data monitoring for efficient waste management. The system aims to optimize the collection, segregation, processing, and recycling of organic waste, minimizing environmental impact while promoting sustainability.

The OT-based OWMS utilizes sensors, IoT devices, and data analytics to monitor waste generation patterns, detect irregularities, and track the overall process from waste collection to final disposal or conversion into useful products like compost or biogas. The integration of automation in the waste processing phase, such as in composting and anaerobic digestion, enhances operational efficiency and reduces the manual labor required. Furthermore, the use of cloud computing and big data analytics allows for predictive insights, helping optimize routes for waste collection and improve the overall waste management lifecycle.

This system offers an effective solution to the challenge of managing organic waste, with potential applications in both residential and industrial sectors. By integrating OT with sustainable waste practices, the proposed system contributes to the circular economy by transforming organic waste into valuable resources while reducing greenhouse gas emissions and land use.