

Discrete Event Simulation for Design of Source-Segregated Waste Collection System to Maximize Recycling Rates: A Case Study of Vietnam National University Ho Chi Minh City Urban Area

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Abstract

In line with Decree No. 45/2022/ND-CP, effective 1 January 2025, Vietnam mandates nationwide household waste separation at the source, with penalties for non-compliance. However, enforcement faces skepticism due to insufficient infrastructure and unclear monitoring mechanisms. This study, approached from an industrial engineering perspective, addresses the prior issue through a dynamic stochastic model developed using Rockwell Arena. The discrete-event model simulates waste collection in the VNUHCM Urban Area, serving as a baseline for comparing global collection schemes. This enables policy exploration in a virtual environment without disrupting real-world operations. Findings are expected to support policy makers in refining waste management strategies, particularly within VNUHCM, and provide system engineers, waste management designers, and researchers with a validated case study. Additionally, the study aims to offer NGOs, NPOs, and ESG institutions valuable data and methodologies for urban development projects, ultimately improving living conditions for VNUHCM residents. The scope of this thesis is confined to the VNUHCM Urban Area, focusing on municipal solid waste generated from institutional and dormitory sources. The study's limitations include budget, time constraints, and reliance on data from similar systems in developed countries.

Keywords

Municipal Solid Waste, Source-segregated waste, Discrete-Event, Simulation