



Assignment-simulation model for forklifts in a distribution center with aisle constraints

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ABSTRACT

This study proposes a simulation model for allocating counterbalanced forklifts in a logistics distribution center (LDC) with aisle constraints. Modeling the case study for a consumer goods firm, the performance measures of the logistics operation were calculated and certain experimental scenarios were purposed for decision-making regarding the number of forklifts and their productivity. The relevance of this research is validated by the gap in existing literature on enhancing forklift assignments in massive storage systems with restrictions. The simulation scenarios contribute toward standardizing logistics operations with similar characteristics, starting from the layout stage of an LDC. The designed simulation model demonstrates that the simulated allocation incorporates technical and human resources in warehouse operations. Utilizing discrete-event simulation (DES) as a framework, this study assesses various scenarios in an LDC with restrictions on the forklift. The hypothesis of the problem was analyzed, and the simulation model was used to characterize the system behavior under different scenarios and guide the decision-making processes impacting operational costs and client service levels. This research employs DES to address performance indicators and operational costs, serving as a methodological guide for resource allocation in logistics operations at distribution centers.

1. Introduction

Contemporary logistics firms are confronting global challenges that influence midterm operational costs. The COVID-19 pandemic, global market integration, logistics networks, and the transition to sustainability pose substantial challenges, diminishing business competitiveness. Specifically, in Latin America, the Inter-American Development Bank reports that the logistics performance of the region significantly lags behind other nations [1]. This decline relative to previous periods profoundly affects the ability of organizations to navigate uncertainty and fluctuating demand.

The Development Bank of Latin America, formerly known as the Andean Development Corporation (CAF), examined Latin America's logistics profile, focusing on infrastructure, services, processes, information systems, management, institutional framework, and regulation. This analysis revealed a paucity of genuine logistics operators and a notable scarcity of logistics platform development projects [2]. These findings underscore the necessity of fostering academic research projects to conceive new logistic strategies.

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