Proceedings of the 1st Annual World Conference
of the Society for Industrial and Systems Engineering,
Washington, D.C, USA
September 16-18, 2012

Analysis of Campus Traffic Congestion During Move-in Days Using Discrete Event Simulation Model

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Abstract: This study proposes a Discrete Event Simulation (DES) model for effective vehicle routing and resource allocation during move-in days at a University campus. The campus has 6 residential communities at different locations, and each community consists of a set of several buildings. It is observed that more than five thousand vehicles enter into the campus along with regular traffic during the move-in days. Each vehicle requires a randomly distributed unloading time at the designated residential community and building, which typically has a limited parking capacity. Therefore, it is critical to determine appropriate number of staging areas and effective routing of vehicles, and allocate resources such as move-in carts for an effective traffic control. The objective of this study is to minimize waiting time of vehicles and ensure effective coordination of available resources during the move-in days. Due to complexity and uncertainty of the vehicle routing and resource allocation problem, a DES model is developed, using SIMIO software, in which each vehicle follows a desired sequence, based on its destination. The experimental results indicate that the average waiting time of vehicles at staging area has significantly decreased by around 82% on using different routes for different destinations and efficient resource allocation. The proposed alternatives yield statistically significant improvements from the baseline.

Keywords: Move-in days, Vehicle routing, Simulation, Waiting time