

Abstract

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MODELLING CONTAINER LOGISTICS PROCESSES IN CONTAINER TERMINALS: A CASE STUDY IN ALEXANDRIA

This study aims to optimize the logistics processes of container terminals. Potentially powerful pipe-flow models of container terminal logistics processes have been neglected to date and modelling of terminals is rare. Because research which adopts a pipe flow and dynamic operational perspective is rare, a case application in Alexandria, Egypt collated empirical container and information flows using interviews and company records to describe its logistics processes and model container and information flows. The methodology used includes qualitative and quantitative methods and a descriptive methodology proceeds sequentially. Primary and secondary data were presented as a pipe flow model to show interrelations between the company's resources and to identify bottlenecks. Simulation modelling used Simul8 software. Operational level modelling of both import and export flows simulated the actual inbound and outbound flows of containers from entry to exit. The import logistics process includes activities such as unloading vessels by quay cranes, moving containers by tractors to yard cranes to go for storage where customs procedures take place before exiting the terminal by customer's truck. The export logistics process includes the activities associated with customers' trucks, lifters, storage yards, tractors and quay cranes. The model takes into account the uncertainties in each activity. This study focuses on operational aspects rather than cost issues, and considers container flows rather than vessel flows. Although the simulated model was not generalized, implementation elsewhere is possible. Following successful validation of a base simulation model which reproduces the case company's historical scenario, scenario testing empowered the case company to pro-actively design and test the impact of operational changes on the entire logistics process. The study evaluates a typical container terminal logistics system including both import and export containers in the presence of multiple uncertainties in terminal operations (e.g. quay crane operations, tractor operations, yard crane operations). Sensitivity testing and scenario analysis can empower terminal managers to make decisions to improve performance, and to guide terminal planners, managers, and operators in testing future investment scenarios before implementation. Keywords: container terminals, logistics processes, modelling, simulation, scenario analysis, sensitivity testing.