C.J.D. Louw *Simulation tool for testing crane and berth assignment procedures in a dry bulk import terminal*
Computer program, Report 2008.TEL.7251, Transport Engineering and Logistics.

As a result of the increased world trade, induced by global economic growth, shipping is one of the fastest growing economic sectors. These increasing volumes of traded commodities are handled by ports. A common commodity that is transported by sea is dry bulk which is transported by dry bulk carriers. These ships are unloaded at dry bulk import terminals. Global competition between these terminals leads to an increasing focus on cost control. Efficiency improvements are required to cope with the increasing volumes of dry bulk.

This report describes the design of a simulation tool that explores possibilities of increasing the performance of a dry bulk import terminal with the existing infrastructure and handling equipment. The scope of the research is the ship waiting area and the quayside operations. A simulation model is designed to simulate the terminal operations based on user input and generate results that allow the effect of this input to be assessed.

In the terminal ships are assigned to a berth and cranes are assigned to a ship. The assignment procedures is use today are straightforward. The effect of these assignment procedures on the performance of the terminal will be determined by implementing alternative assignment procedures in the simulation model. This performance is measured by the key performance indicator, the average ship waiting time.

The simulation model was built and run. It was used to compare alternative procedures for berth and crane assignment to the assignment procedures that are currently used. The results show that the KPI is negatively influenced by implementing a dynamic crane assignment procedure, a procedure in which cranes are constantly being assigned to the ship at which they are needed most. The model revealed that the extra productivity achieved while actually unloading does not compensate for the time lost to travelling, resulting in a lower average crane productivity.

The alternative procedure for berth assignment, however, shows an improvement of 12.5% of the KPI compared to the current assignment procedure, based on the average of the generated results. The standard deviation of the generated results is too large, however, to accredit this improvement to the alternative assignment procedure.

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