Incorporating Maritime Stakeholder Perspectives for Implementing an ‘Inland-Depots-for-Empty-Containers’ System Using an Analytic Hierarchy Process

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ABSTRACT

Container movement involves several stakeholders where each group is focused on achieving its own objectives. By actively considering the perspective of different maritime stakeholders, this paper identifies a set of implementation strategies and prioritizes them to successfully implement an ‘Inland-Depots-for-Empty-Containers’ (IDEC) system in a region. It builds on the authors’ earlier work that developed and evaluated an IDEC system to minimize the overall system costs associated with regional repositioning of empty containers. Based on the benefits, costs and risks perceived by the involved maritime stakeholders on IDEC implementation, the authors identify strategies that may facilitate the building process and establish the system sustainably. They judge and prioritize the strategies in an Analytic Hierarchy Process (AHP) framework and present results based on their analysis. The authors believe that this research will benefit authorities considering an IDEC implementation strategy and also AHP practitioners.

Keywords: Analytic Hierarchy Process (AHP), Empty Container Repositioning, Inland-Depots-For-Empty-Containers (IDEC), Maritime Stakeholders, Multi-Criteria Decision Making

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INTRODUCTION AND BACKGROUND

Maritime transportation deals primarily with the movement of international freight and enables long distance transportation of goods over sea at cheaper costs. Containerization has played an important role in the development of maritime industry. It has made the transportation and handling of cargo enormously efficient and boosted sea trade. Worldwide container traffic has grown tremendously in the past decade. Starting from about 169M TEUs (considering both empty and loaded) in yr. 1998, it grew to 387M TEUs in yr. 2008; nearly tripling in volume (BTS, 2009). Global container traffic has experienced a decline from the third quarter of the year 2008; however, it is expected to revive rapidly in the coming years. The growth in container traffic will continue to grow as demand for foreign-manufactured goods grow, liberalization of the transportation sector increases, and technological advances occur. Large expenses are incurred by container owners in managing this container fleet. With the shift of manufacturing bases from high-cost Western economies to lower cost countries in Asia and the persistent trade imbalance, empty container repositioning has become a grave issue for maritime stakeholders. Statistics show that USD 9 billion alone is spent annually in empty container repositioning (Dynaliners, 2006). Additionally, if the empty inland haulage costs are added, it would lift the total cost by well over USD 1 to 1.5 billion (Lloyd’s shipping economists).

Empty containers are repositioned at all levels of container movement – global, inter-regional and regional (Boile, Mittal, Golas, & Theofanis, 2006). At the global level, empty containers (hereafter also referred as empties) are repositioned over sea between two foreign ports, usually from areas of surplus to areas of empty container deficit. At an inter-regional level, they are repositioned over land, by truck or rail, usually between a region of importation and a region of consumption. At a regional level, empties are repositioned between importers, exporters, empty container depots and marine terminals. Our research concentrates at the regional level of repositioning and addresses existing inefficiencies in the regional repositioning system.

Figure 1 (Case A) shows a typical current practice of regional empty container repositioning (Boile, Theofanis, Baveja, & Mittal, 2008). Here, empty container depots are located close to the port while customers are inland in the region. With every demand and supply of loaded container generated in/from the region, empty trips are produced between the customer and depot. This leads to excessive unproductive empty vehicle miles travelled on regional highways and increased overall system cost in repositioning empties. This practice becomes detrimental when both distance and volume of containers between the two nodes increase. Additionally, double-digit growth in containerized trade volume with persistent trade imbalance strains existing regional depot capacities.

To address the two issues – (a) excessive empty vehicle miles travelled on regional highways, increasing congestion, pollution and fuel consumption costs proportionally in the region, and (b) strained depot capacity due to growth in maritime trade volumes, we earlier proposed to build an ‘Inland-Depots-for-Empty-Containers’ (IDEC) system in such regions (Boile et al., 2008). Case B in Figure 1 illustrates the proposed system. Here, new depots are built inland in the region closer to customer clusters, while existing depots remain near the port. We used the port region of New York/ New Jersey as our study area for feasibility/ effectiveness study of the IDEC-system. Data on container inventories and depot capacities was presented in the paper. Case B vs. Case A demonstrated the reduction in ‘empty-vehicle-miles’ traveled, ‘total system cost’ in repositioning empties and increase in the ‘empty-container storage capacity’ by building an IDEC-system. We also analyzed and established the effectiveness of the proposed system in regions with different geographic area, infrastructure, trade pattern, and anticipated maritime traffic growth.
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