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## **Analyzing the role of seaport operations in generating inbound/outbound truck traffic demand and its implications on traffic system**

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In gateway seaports, like the port of Rotterdam, a substantial proportion of all freight movements is related to trips to hinterland markets. An upward trend in container volume and call size in such ports around the world puts pressure on the hinterland transport leading to congestion on the surrounding road network. European union road federation statistics (ERF 2017) shows a 3.6% increase for road in inland transport modal split between the years 2000 and 2014. Generally, the interrelation between traffic and logistics system is more significant in the port area because a significant share of traffic on the port collection and distribution network comprises road freight (Peng et al. 2018). An empirical work from Wan et al. (2018) indicates that a 1% increase in delays attributed to the road congestion contributes to 0.9 to 2.48% reduction in the port's throughput. Inbound and outbound truck flows from port areas, especially in traffic rush-hours, may degrade the level of service on truck-dominated motorways or increase the unreliability of freight transport operation. Therefore, these truck flows during traffic rush hours are of particular interest to both port and road transport authorities.

Consequently, the main objective of this paper is to identify key features of port activities that induce truck traffic during rush hours by using both terminal activity data, at the container level, and truck-specific counts obtained from loop detector data for the year 2015. In this paper, we focus on inbound/outbound truck traffic. The terminal activity data lack the information regarding the actual pick-up time of the container. We retrieve this information from truck-specific count data; we observe that truck traffic around port areas is marked by a single peak in a day. It is our assumption that if this peak coincides with the evening rush hours, i.e., 3-6 PM, port activities for that whole day contributes to the rush hour congestion on truck-dominated motorways. To infer what contributes to this pattern, we use a random forest classification technique to estimate the importance of the key attributes of terminal operations on peak hour truck flow and we unravel the causes behind it by performing exploratory data analysis.

From our analysis, we find that terminals operational attributes such as estimated pick up time and container discharge time contribute mostly to the rush hour truck traffic. Besides, we identify the vessel attributes (call size), container features (size and type), and commodities which brings inefficiencies in the traffic system. To the best of our knowledge, this paper is the first paper which provides an empirical study to understand the interrelations of port operations and truck traffic flow. Our research would be of interest to traffic managers, port of authority, and freight forwarders to invest in interventions which could improve the reliability of road freight operations.

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