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A Method and System for Container Inventory Management

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Abstract : Due to the variability in global trading patterns, some ports in the world experience a shortage of shipping containers while the rest of the ports have excess container stocks. According to this study, carriers operate and manage their container inventories independently, leading to enormous container repositioning costs. In contrast, the researcher suggests that costs can be minimized if carriers exchange containers among them. In other words, rather than repositioning excess containers, a carrier could offer them to another carrier in the same port that has a shortage and vice versa. However, this is easier said than done because there is huge complexity in global container management as it involves many operational parameters such as multiple types and sizes of containers, the varying transit times of different carriers, etc., and the exchange may take place in various ports globally. Therefore, the exchange should be facilitated through a fully comprehensive automated computer system that could consider all the parameters that impact the possibility of exchange containers. Accordingly, the research used mixed research methods, combining qualitative and quantitative approaches. Data analysis is conducted using SPSS tools, and a prototype is developed as the output of the research. The proposed mathematical solution will proactively scan through the container size, type, and volume of every member carrier in each port and map how the deficit and excess quantities could be shared among them and set off the imbalance of empty container reposition at ports of their interest. The approach includes obtaining and processing container inventory information from multiple parties in real time for assessing container data associated with each party for each port at a given time. Using the container data, container inventories for each party at each port for a defined time are forecasted. A first party having surplus (offeror) and deficit (offeree) of empty containers at a first and a second port at a first time, respectively, is determined. A second party having a deficit and surplus of empty containers at the first time, respectively, is determined. Offering the first and the second party a container exchange opportunity to enable the first party to supply surplus empty containers to the second party at the first port based on the first container characteristics and the second party to supply surplus empty containers to the first party at the second port based on the second container characteristics. After the offeree obtains containers, they will be shipped to a port determined by the exporters. To ensure the sustainability of this method, the system should provide equal benefits to both the offeror and the offeree. Accordingly, the system will consider not only the number of containers exchanged but also the duration the offeree may hold them in its custody. This reduces container repositioning costs by utilizing mathematical modeling, algorithms, big data, machine learning, and artificial intelligence. This method and system may reduce the container repositioning cost by twenty percent.

Keywords : container inventory, benefit of exchange, reposition, imbalance, shipping, carriers, offeree, offeror
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