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Vehicle routing optimization in Sri Lankan megacity logistics context

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Sri Lanka has been making its way to develop its metropolitan city, Colombo, as a megacity. Transportation is one of the basic components to consider in planning any city emerging as megacities. City logistics function is a major factor which influences the economy and the social activities of a country. In megacity logistics, the growth in the volume of freight traffic and the aim to optimize the logistics activities have led research in recent years. According to the National Transport Report for year 2017, Port of Colombo handled 651,968 of Imports (TEUs) alone in year 2016. The majority of the destinations of this freight is Colombo and its suburbs. Considering the growing demands, the Western Region Megapolis Master Plan has been developed to cater systematic inland freight transportation in Colombo and suburbs. Therefore, it is important to focus on optimizing the urban transport network as well as the freight transport which has been given insignificant attention to date. Routing of flows and scheduling of deliveries are the two main factors to be considered in optimizing freight transport on which a lot of opportunities lie upon. Routing of flows is the pattern of flow at different spatial scales and scheduling of deliveries determines the flow of freight traffic through time windows. This study investigates the impact of city logistics for the road network in Sri Lanka, considering the main land transport corridors to map the freight flows as identified in the Megapolis Master Plan – Sri Lanka. This is done through a systematic data collection from a company handling freights within Colombo to match the Sri Lankan city logistic scenario about the freight transport regarding the units that are transported, and travel times taken for the considered destinations from the depot where freights are consolidated before released into the road network. It also identifies main city destinations around Colombo, the freight flows and freight volumes (in TEUs) in determining the impact of it for the road network. Thereby, this study will depict a vehicle routing optimization model to optimize the freight outflow function, minimizing the time taken. This is conducted through a simulation-based approach using the Supply Chain Guru simulation and modelling software, which is tested with the data collected. This vehicle routing simulation will provide platform for improved operation with identified demands to minimize the freight traffic and decision making in terms of the road network utilization for future demands.

Keywords: Optimization, Megacity, Freight transportation, Vehicle routing