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# Developing a Lower Bound and Strong Heuristics for a Truck Scheduling Problem in a Cross-docking Center

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## Abstract

Nowadays, with the economical worldwide developments, logistics have turned out to be a substantial issue and has its own specific importance with certain position. Hence, both declining time and decreasing costs of logistics are considered to be significant goals of the supply chain management. One of the procedures to attain these goals is using the cross-docking systems which has rarely been concerned by organizations despite its desirable performance. Besides, according to the recent related papers, utilizing both heuristics and metaheuristics to solve the problem is an interesting topic in this research area. So, in this paper, to find the optimal for receiving and shipping trucks sequence, we employ five metaheuristics along with hybrid one. Furthermore, two heuristics are firstly developed in this research area which generate better solutions in comparison with the previous ones proposed in the literature. Besides, Taguchi approach is employed to tune the parameters of algorithms. The results of the developed heuristics and metaheuristics are compared with each other and also with the results yielded by previous related works in terms of different criteria such as solution quality and computational run time. In addition, to probe the performance of the algorithms precisely, a new lower bound is developed.

## Keywords

Cross-docking; Truck scheduling; Heuristic; Hybrid metaheuristic; Lower bound

## 1. Introduction and literature review

Rapid growth in the change of technology, yielding new products with new specifications in a short period of time, appearing new brands as well as new markets and demands, and also rising customers' expectations aimed at receiving goods and services in a proper time and location with the lowest cost, have led several companies to be in need of applying supply chain management theories in order to preserve and improve their own positions. Thus, the role and the importance of accessible facilities of logistics and supply chain objectives make sense more than bygone. So, enhancing and developing some of the previously proposed heuristics, methods, and optimization techniques in order to improve the performance of the supply chain is still needed in the literature (Mostafa Hajiaghahi-Keshteli and Sajadifar, 2010).

Cross-docking system is one of the facilities helping a supply chain manager to reach the supply chain objective and its competitive advantages. So, today's logistics companies are turning to cross docking which brings significant benefits including little or no inventory, low

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