

Developing A Nonlinear Programming Model for Scheduling and Routing of Transportation Systems

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Received: February 2026- Accepted: May 2026

ABSTRACT

The vehicle routing problem is one of the most important optimization problems. Routing issues refer to a set of issues in which a number of concentrated vehicles are stationed at one or more bars and must visit a set of customers, each of whom has a certain demand, and provide services. The purpose of this study is to provide a routing and scheduling model of the transportation system for long routes. For this purpose, after studying the sources and references related to the design of integrated distribution systems, the investigated problem was modeled in the form of mixed integer nonlinear programming considering the limitations and assumptions. After the exact solution of the model, and due to the problem being NP-hard, two meta-heuristic algorithms of harmony search and refrigeration simulation algorithm were used to solve the problem in large dimensions. It should be noted that the four criteria of cost, carbon dioxide gas emission, start-up time and level were evaluated, and the results indicated the high performance of the refrigeration simulation algorithm compared to the search for harmony. Specifically, to solve the model in large dimensions, it was found that the refrigeration simulation algorithm with a two percent improvement compared to the harmony search algorithm has reduced the costs of the chain. On the other hand, in the cargo transfer time, the refrigeration simulation algorithm has transferred the products between the factory and the customer with an average time of 90minutes compared to the Harmony search algorithm by two percent.

Keywords: Supply Chain, Vehicle Routing Problem, Forward Propagation, Harmony Search Algorithm