



***MINIMIZATION OF TOTAL TRANSPORTATION COSTS IN A
DELIVERY NETWORK WITH A SINGLE ORIGIN AND SINGLE TRIP
DISTRIBUTION SYSTEM***

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The candidate has carried out research for the MBA in Supply Chain Management in the Department of Transport and Logistics Management of University of Moratuwa under my supervision.

Signature of the supervisor:

Dr. Mahinda Bandara

Date:

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ABSTRACT

Invention of contemporary solutions in transport and logistics sector is significantly important with the growth in the volume of freight transportation in any local and international context. Most transport problems are related to the cost incurred through congestion, shortage of labour and the fuel price hike. Each vehicle fleet of individual organizations should be improved and managed to its optimum level to eliminate waste and costing transportation. Transportation management systems (TMS) are used to minimize aggregate operational costs in many companies worldwide. TMS is a subset of supply chain management concerning transportation operations and may be part of an enterprise resource planning system. A TMS usually "sits" between an ERP or legacy order processing and warehouse/distribution module. A typical scenario would include both inbound (procurement) and outbound (shipping) orders to be evaluated by the TMS Planning Module offering the user various suggested routing solutions. These solutions are evaluated by the user for reasonableness and are passed along to the transportation provider analysis module to select the best mode and least cost provider. Once the best provider is selected, the solution typically generates a schedule of loading the vehicles in order to dispatch shipments with the selected carrier, and later to support freight audit and payment (settlement process). Links back to ERP systems (after orders turned into optimal shipments), and sometimes secondarily to warehouse management system (WMS) programs also linked to ERP are also common. Estimating the total cost of an ERP software solution requires a careful assessment of an array of variables which can vary wildly from one company to the next. The size of a business, its unique requirements and the scope of use all play a critical role in determining the cost of system.

Understanding the factors that influence the cost of ERP will help give you a better idea of how much a business can expect to pay. Moreover, it gives the enterprise the knowledge to carefully evaluate estimates that fall significantly below or above industry standards. Most ERP systems are priced on a per-user basis. Specifically, the number of users that will be using the system at the same time and the level of access they require. The number of users and the

functions which are included are factors that affect the price and the price in most cases is exorbitant.

The main objective of the research is to introduce a simplified and low-cost method of minimizing the transport costs by minimizing the number of truck movements or vehicles in the fleet, maximizing the quantity volume per kilometre, minimizing the mileage of each vehicle in the fleet and finally generate a rational but easy to use dispatching schedule for start-ups, small and medium scale companies who are yet to implement a sophisticated and integrated transport scheduling system. This research was carried out considering, outbound logistics of companies which are having the spoke-hub distribution system.

Analysis will be carried using randomly generated data which include vehicle fleet data (trucks) and customer (Agent) demands. To minimize the total transportation cost, the optimum number of truck movements with different capacities was selected for each agent by applying the Simplex Method in Linear Programming. The results will give a proper insight to prepare a vehicle schedule to dispatch each shipment by considering the agent's available safety stocks. This study assists the company to reduce its carbon footprint by eliminating unnecessary truck movements. Human errors were also reduced by using this systematic way of scheduling vehicles. Outcome of the research demonstrates that the application of the proposed model for truck scheduling system in transport operation to increases the efficiency of outbound logistics thereby maximising the profit of the company. This paper therefore brings a solution to the vehicle scheduling problem and overcomes the bottlenecks in transportation at such companies.

Keywords: Transportation Optimization, Fleet Optimization and Management, Outsourcing, Cost minimization, Enterprise Resource Planning, Simplex Method