ABSTRACT

A manufacturing supply chain needs to have an efficient and effective outbound logistics network (OLN) to satisfy the needs and requirements of its customers. Present day customers want everything with better quality, cheaper price, and at a faster pace. Thus, in order to keep pace with the changing trends, the firms need to plan, design, develop, and deploy innovative OLNs for their supply chains. Furthermore, the firms need to evaluate and reconfigure their OLNs on a continuous basis to stay competitive in the field.

The research work presented in this thesis focuses on reconfigurable outbound logistics network design for a manufacturing supply chain. The body of literature in the area of production-distribution network design in supply chain management is rich with many commendable contributions in solving industrial problems under diverse settings. However, research works addressing design and development of OLNs with differentiated distribution concept are found to be scarce. Thus, this thesis focuses on the design and development of reconfigurable OLNs for a manufacturing supply chain based on differentiated distribution concept.

The thesis proposes and presents a *product-specific* OLN for a manufacturing supply chain where products can be categorized based on the nature of market demand (or market share). The thesis develops three mixed integer linear programming (MILP) models under diverse settings to address the problem on hand: a mono-objective model in single-period, a mono-objective model in multi-period, and a multi-objective model in single period. These types of models belong to the class of combinatorial optimization or NP-hard. Thus, metaheuristics and hybrid metaheuristics are employed to solve the large size and computationally complex problems to obtain near-optimal solutions. The results obtained for data sets with randomly generated parameter values are tested and validated statistically. The thesis lists the managerial insights that are derived from this study and are useful to practicing logistics and supply chain managers. The models developed in this thesis are generic in nature and can be applied to other manufacturing industries under similar conditions.

Keywords: Outbound logistics network design, Manufacturing supply chain, Logistics network configuration, Differentiated distribution concept, Combinatorial optimization, Mixed integer linear programming, Metaheuristics