

**AHP integrated MILP approach to minimize transportation cost to
prioritize distribution requirements**

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Abstract

Customer satisfaction can be considered as the most important factor for any business as it is tightly linked to revenue and determines the company's growth and the sustainability. Further it is the leading indicator of customer repurchases and loyalty. Final outcome of the effective supply chain (SC) management is to make the customer loyal and if failed it would result to transfer the customer towards the competitor. Understanding this importance, research in supply chain management (SCM) has grown significantly in recent years. Many organizations have identified that customer satisfaction (CS) and the SC cost are linked and it is impossible to optimize both at the same time. Many studies have been done under different situations to minimize transportation cost (TC) as it ultimately reduces a tremendous amount of SC cost. The need for a reliable approach to optimize customer satisfaction while minimizing the transportation cost has been raised in many occasions as improving customer satisfaction is a goal sought by many businesses in the logistic industry. This requirement becomes critical when the distributor has to select a set of customer orders to be delivered when the supply is less than the demand. Therefore, the objective of this study was to develop a model to find a way to optimally satisfy the customer orders, while minimizing the transportation cost. As a result, a customer focused approach is presented by incorporating Analytic Hierarchy Process (AHP) and then employing a mixed integer linear programming (MILP) model to find the optimal solution. The proposed model addresses customer satisfaction while minimizing the transportation costs

Keywords: Analytic Hierarchy Process, Customer satisfaction, Logistics, Supply chain management, Transportation cost

Introduction

Satisfying customers' needs is the key to the success of many companies. Supply chain design has a vital role to play in the logistics decision-making process. The importance of supply chain design has increased when more and more companies have understood the possibilities of offering increased value to their customers by restructuring the supply chain. Among the general processes of a supply chain, transportation or the distribution of goods makes a significant contribution. In addition, transportation as a part of logistics operations can be seen as a value-adding process that directly supports the primary objectives of the companies, which is to be competitive in terms of high-level customer service, competitive price and quality, and flexibility in responding to market or customer demands. Satisfying customers' demands on time is very important, both from a cost reduction perspective, and for its role in increasing the service level of customers. In the distribution process, a variety of supply chain (SC) objectives can be achieved, such as, minimize SC cost, maintain a seamless SC, and provide a high level of service to the customer (Sharma et al., 2008). Logistics costs form the major part of a SC's cost (Farahani and Elahipanah, 2008). The TC alone comprise the highest percentage of this expense for