"Design of Supply Chain Network to Optimize Transportation Cost"

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ABSTRACT

Supply chain management SCM has becoming a topic of critical importance for both and formulated as linear programming problems with costs of transportation that arise companies and researchers today. Supply chain optimization problems are considered in several real-life applications. This project work develops linear programming method for solving the cost-related problems. The proposed method attempts to optimize the total transportation costs with reference to available resources (trucks) in the company, as well as at each transhipment point. Sensitivity Analysis SA was employed to investigate how a change in the model data changes the optimal solution. An industrial case is used to demonstrate the feasibility of the applying LP method to a real transportation problem. This project will enable companies to take advantage of this opportunity to improve on their supply chain.

Introduction

Supply chain management is a field of growing interest for both companies and researchers. This is era of supply chain management. Supply chain management (SCM) definition varies from one enterprise to other. We define a supply chain (SC) as an integrated process where different business entities such as supplier, manufacturer, distributers and retailers work together to plan, coordinate, and control the flow of materials, parts and finished goods from suppliers to customers.

Organizations adapt numerous business improvement methods to improve the business performance. Manufacturers and researchers have noted several problems regarding to supply chain activities in their research and practice. Such that in practice, companies like Dell, Walmart, Samsung, Toyota, Lenovo, Gome etc which are totally based upon supply chain methodology have used different performance management tools to support their supply chain strategies monitoring and improvements of performance of a supply chain has become an increasingly complex task. A complex performance management system includes many management processes, such as identifying measures, defining targets, planning communication, monitoring, reporting and feedback.

The supply chain management (SCM) implementation in a manufacturing organization achieves competitive advantage and strategic fit over other manufacturing organizations. A supply chain (SC) includes all the activities, functions and facilities involved in the flow and transformation of goods and services from material stage to the customer.

Literature review

Engr. Dr. Uzorh, A.C1and Nnanna Innocent (July 2014) (Coca-Cola)

- They proposed the method or attempt to minimize the cost with the help of Linear Programming method for solving cost related problem.

- They analyzed the data of Coca Cola and tried to test the feasibility of the LP analysis on actual industry data.

- After research they found that 39.20% of the company total expenditure under transportation sector for six years was on maintenance alone, while 20.50%, 8.79% and 5.05% was on Fuel, drivers welfare and loading/offloading respectively.

- The results conclude that the optimal decision is not to increase the number of truckloads per depot, but to reduce the cost of maintenance of trucks by adopting predictive and preventive maintenance rather than corrective maintenance. It also recommends that the issue of conventional wisdom (i.e. if it is not breaking, then don't fix it or that parts are expendable to some degree) should be eliminated.

Jan Havenga Zane Simpson, 2014

- In Indian context, with vast geographical reach and higher industrial output, logistics efficiency is even a bigger challenge.

- Poor road infrastructure combined with the volatility in the oil price which is the key driver of transport cost indicate that logistics cost is a strategic resource which requires immediate attention.

- So, Jan Havenga Zane Simpson in 2014 suggested that logistics costs can be broken down into three direct elements, namely transport, storage and handling costs.

Viswanathan and Mathur (1997)

- In 1997 Viswanathan and Mathur suggested that considering vehicle routing in a proper way can lead to the optimization of cost of transportation.

- As the transportation has become a major expense for the firms/companies due to escalating fuel price and higher capital cost of replacing the vehicle, routing of vehicle becomes increasingly important

- Vehicle routing not only helps in saving the cost but also help in serving the customer in shorter time thus enabling better customer relationship.

- Different variations of vehicle routing problems arise because of different scenarios and case objectives.

Rekha Chikhalkar, Silky Khurana and Arpan Khurdelia (2015)

- This study revealed the inherent problem of low truck utilization in the FMCG companies dealing with voluminous products.

- There for the model proposed in the analysis can help companies choose floor position, cube capacity or weight capacity as their optimization criteria.

- To implement this, person at the operational level should be trained in the uses of this tools.

- Companies can also look for opportunities arising from mixing SKUs in different density categories to improve vehicle utilization.

- For further improving the utilization, they should look for ordering pattern of their high-volume customers.

CONCLUSION

Managing data when constructing LP models can be challenging. The data used in LP models is often clouded with uncertainty. A transportation problem was developed with respect to the operations of the **Shree Vasu Logistics** at Raipur with respect to the freight movement between the cities.The data obtained in the study was used with respect to the cities. The problem was solved by using Excel VBA and some advance Solver. The objective was determined, deduced, solved, and the minimum cost for the operation obtained. An industrial

case was used to demonstrate the feasibility of applying the LP method to real-world transportation costs problem. Consequently, the LP and SA methods developed in this work yield an efficient compromise solution and overall decision maker satisfaction.

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