AN EFFECTIVE WAY TO OPTIMIZE KEY PERFORMANCE FACTORS OF SUPPLY CHAIN MANAGEMENT (SCM)

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ABSTRACT

Supply Chain management has become a matter of survival for corporate to face the competition and companies are exploiting various result oriented techniques to discover optimum routes to reduce the costs on non value added activity i.e. transporting goods from one point to another point in right time. Today the organizations are working very hard to supply right product in right time to the customers, by taking the help of researchers with scientific techniques. Even though Supply Chain is broadly divided into outward and inward supply chain and initially for years, researchers have concentrated mainly on the manufacturing rather on supply chain. But recently there has been increasing attention on the performance, design and analysis of the supply chain. In today’s competitive scenario, managing supply chain has become complicated mainly to monitor thousand’s of external data points and made the organizations prepared to react quickly and automatically across the entire supply chain. Effective managing of supply chain speeds time to market reduces inventory levels and lower’s overall costs. This research paper focuses on optimizing performance of outward Supply Chain by optimizing the critical parameters which influences the performance.

Keywords: Key Performance Factors, Lagrangean Method, Supply Chain, Effectiveness

1.0 INTRODUCTION

“A supply chain is the process of moving goods based on the customer order, through the raw materials stage, supply, production and distribution of products to the customer”

"A set of processes and sub-processes which attempt to implement and optimize the functions, connected entities, and interacting elements of a supply chain”

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A recent global survey done by ‘Deloytte & Touche’ showed that more than 66% of respondence indicated electronic links has tools to enhance supply chain relationships. In the available scanty literature, wide arrays of technological tools are available to optimize the supply chains. The right supply chain modeling tool can help to squeeze cost and inventory out of the supply chain while improving service to customers. Modeling tools that can help to optimize supply chains have been around for years. But recently they’re getting increased attention because of their lower cost and greater capability, coupled with companies’ quests for improved supply chain performance. A variety of modeling tools are available today. The right type of model for optimizing the supply chain begins with understanding the environment in which an organization works and how often there is a need to change the supply chain. Dynamic environments have products with short life cycles, or use segmented customer fulfillment with multiple service levels, lead times and fulfillment methods require more frequent supply chain reconfiguring.

Benita M. Beamon\(^1\) in the paper explained the supply chain management has an important role to play in moving goods more quickly to their destination. SCM is a management process that deals with inbound and outbound flows, from the perspective of the focal organization, its suppliers, and its customers. A supply chain is comprised of two basic, integrated processes: (1) The Production planning and inventory Control process (2) the Distribution and logistics process.

These processes interact with one another to produce an integrated supply chain. The design and management of these processes determine the extent to which the supply chain works as a unit to meet required performance objectives. Some of the consequences of supply chain integration result in Reduced inventory at all sites of the supply chain, reduced cost, faster processing speeds, reduced lead times, reduced warehouse costs, reduced obsolescence, greater responsiveness to customer changes, electronic links to suppliers and customers, continuous flow of products and information, speeding up the development cycle.

2.0 LITERATURE REVIEW

The importance of performance measurement in the context of SCM cannot be overstated. Timely and accurate assessment of overall system and individual system component performance is paramount. An effective performance measurement system
provides the basis to understand the system, influences behavior throughout the system, and provides information regarding the results of system efforts to supply chain members and outside stakeholders. In effect, performance measurement is the glue that holds the complex value-creating system together, directing strategic formulation as well as playing a major role in monitoring the implementation of that strategy. In addition, research findings suggest that measuring supply chain performance in and of itself leads to improvements in overall performance.

Despite its importance, supply chain performance often was measured in oversimplified and sometimes counterproductive (cost-reduction-based) terms. Lack of an appropriate performance measurement system has been cited as a major obstacle to effective supply chain management.

In today’s competitive scenario, supply chain management has assumed broader dimension with the coming of the technology. Today it is seen that SCM is a planning and control of the flow of goods and material from the original supplier through multiple production and logistic operations to the ultimate consumer. Hence to meet the expectations, SCM today embraces multiple technologies like ERP, advanced planning and scheduling systems, E-commerce and logistics, execution system supported by business intelligence tools. The ultimate objective is to meet customer demand effectively and efficiently.

3.0 METHODOLOGY

After thorough literature review and discussions with the concerned researchers, the following steps are identified to continue the research work. An attempt has been made in this work to inculcate analytical techniques along with modeling the SCM problem.

3.1 AREA OF STUDY

Even though the Supply Chain Management has been broadly classified into two parts like Inward and outward, a small contribution is made towards optimizing the outward supply chain performance, since the outward has lot of constraints and uncertainties compared to the inward supply chain where everything is in the hands of the organization. The present work focuses on optimizing performance of outward Supply Chain by optimizing the critical parameters which influences the performance. The researcher has made an attempt to optimize the performance of the supply chain by taking a chain with 5 points by identifying the nearest route to deliver the goods with the help of OR Technique.

3.2 PROBLEM IDENTIFICATION

The problem is identified and all the parameters which have influence on performance of supply chain either through the literature survey or by collecting the information from the corporate are collected. In this case the objective of the problem and the constraints are identified. The secondary data may be required for identifying the problem. This may involve the following:

- Diagnosis of the problem from its symptoms if not obvious (i.e. what is the problem)
- Delineation of the sub problem to be studied. Often we have to ignore parts of the entire problem.
- Establishment of objective, limitations and requirements.
3.3 PROBLEM FORMULATION

The problem can be modeled in different ways, and the selection of an appropriate model may be crucial to the success of the problem. In addition to algorithmic considerations for solving the model, the availability and accuracy of the real-world data that is required as input to the model also must be considered. Note that the "data barrier" can appear here, particularly if people are trying to block the project. Often data can be collected/estimated, particularly if the potential benefits from the project are large enough. In this case a clear formulation is expected, where the objective function and the constraints are identified. An attempt also will be made to explore the various techniques to solve the same. In this research, an attempt has been made to minimize the total Supply chain model cost (Outbound) for the given constraints. The costs like Transportation, Carrying, Ordering and Information Costs are the constraints in the problem, which will be minimized without disturbing the supply chain. After formulating the problem with the objective function and constraints, the same may be solved using the Lagrangian Method for getting initial solution. After reviewing the solution, the fine tuning of the solution will be done to suit the organization needs. The initial Supply chain model is as follows:

Total Supply Chain Cost = Order handling costs + Inventory costs + Warehousing costs + Transport costs + Information costs

Equation

Objective Function:  Minimize Z  =  \alpha + \beta_1(Tc) + \beta_2(Op) + \beta_3(Vc) + \beta_4(Wc) + \beta_5(Ic) + e  
Where \alpha = constant

Tc = Transportation cost = No. of units x Transport cost per unit
Op = Order Processing cost = No. of orders x Order cost per order
Vc = Inventory carrying cost= No. of Units x Storing cost Per unit
Wc = Warehousing cost= No. of Units x Warehouse cost per unit
Ic = Information Cost= Cost spent on collection of Information

\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, are the associated output elasticities and e represents the error term.

Since the numbers of variables are more than the number of constraints, the problem becomes complex that to without assuming zero for any variable makes still complex, hence the Lagrangean Method is the only mathematical technique is used for solving by using MATLAB for the initial solution. Operation Research technique is used for fine tuning the solution to meet the expectations of the organization.

3.4 MODEL VALIDATION

Model validation involves running the algorithm for the model in order to ensure:

- Input data is free from errors.
- Results from the algorithm seem reasonable (or if they are surprising we can at least understand why they are surprising). Sometimes we feed the algorithm historical input data (if it is available and is relevant) and compare the output with the historical result.
3.5 SOLUTION OF THE MODEL

Specially developed algorithms, can be used to solve the model. In practice, a "solution" often involves very many solutions under varying assumptions to establish sensitivity.

3.6 IMPLEMENTATION

This phase may involve the implementation of the results of the study or the implementation of the algorithm for solving the model as an operational tool. In the first instance, detailed instructions on what has to be done (including time schedules) to implement the results must be issued. In the second instance, operating manuals are used as one of the algorithm and an operational tool. Hence form above steps; we can conclude that the first step, understands a model, the assumptions made to represent the system mathematically or in a simulation. The next step can be to understand the uncertainty and variability used to build the model.

4.0 CONCLUSION

Supply chain performance measurement is vital for a company in order to survive in today’s competitive business environment. Supply chain performance measurement should be a business-critical process, driven by metrics and supported by business intelligence. With increasing competition and changing market forces, tapping into this critical asset is essential in sustaining competitive advantage in the global space. The models and methods used to accurately study the systems are, expectedly, complex. However, if supply chain systems could be classified on the bases of specific characteristics, such as uncertainty or volume of demand, number of echelons, or number of items produced, there may be rule-of-thumb techniques that suggest operational characteristics that may achieve a certain objective (or set of objectives). Based on review of literature we can concentrate on particular characteristics like uncertainty, risk or certainty of supply chain and we can device a model for optimization of key factor in that area.

5.0 REFERENCES


