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The role that modelling, and analysis techniques has for providing solutions for global logistics, and supply chain problems

Abstract

This report highlights some of the methods used in providing solutions to problems in the supply chain. The use of the supply chain network design method to improve efficiencies of locations and to interlink all the elements in the supply chain. The heuristic methods importance in scheduling and tactical planning is highlighted in this report. The SCOR model and its use for transparencies, of each of the functions within the supply chain for optimisation is highlighted in this report. The economic order quantity and its use in inventory management to minimise material holding costs by efficient ordering by analysing lead times.

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2.0 Introduction

This report will highlight different methods used by organisations within supply chains to increase the efficiency and finding solutions to problems. The supply chain network design method will be highlighted in this report. The heuristics method will be highlighted for its

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uses in tactics and scheduling, and the SCOR method will be highlighted in this report for its possible optimisation of the supply chain, followed by the economic order quantity method for its possible benefits in cost reduction for inventory management.

3.0 Supply chain network design method

According to (Mangan & Lalwani 2016) The supply chain is a network of internal, and independent organisations performing internal functions to feed the next organisation in the chain, from 2nd tier suppliers to 1st tier suppliers, to purchasing of materials, manufacturing, logistics, marketing, and to allow a systematic flow both upstream and downstream of information, materials, services, and finances. The network works together as one to try and maximise efficiencies, and profits, while trying to add value and achieve customer satisfaction.

According to (Koksharov 20016), and (Shapiro 2007) the supply chain network design method is used to establish where is the most efficient location to have each facility to perform their function, and the routes the products take within each facility in each location. In other-words the place of manufacture is determined, and the location of distribution centres, and warehouses are determined to establish the most efficient flow of materials from the point of origin, to the point of consumption. The decisions regarding marketing and sales, and delivery and billing are made by independent participants within and throughout the supply chain. The size on the market should determine how many parties are within the supply chain, because of the greater volume of products flowing through the supply chain to meet demands. The larger the market share for example will increase the need to internalise logistical functions, rather than using third party logistic service providers, which can slow down the flow, and causing delays creating a less efficient supply chain.

4.0 Heuristic method

According to (Shapiro 2007) this method is used to try and find solutions to problems within a supply chain. The solution gained from this method may not be the most efficient, however this method is great for solving a problem quickly, giving possible solutions to that problem to choose from. This method is used frequently for combinatorial optimisation problems in choosing a tactic or scheduling operational work. To improve the results general purpose heuristics are often combined with problem specific heuristics. An example of this method being used in the book was, if there were 20 customers to deliver to out of a possible 1000 potential customers, with 50 possible routes to take to deliver to all those potential customers. A set of 10^{10} possible routes are selected from the model (Koksharov 2016).

5.0 The SCOR Model

The supply chain operations reference model (SCOR) is a tool used by multiple organisations throughout the supply chain, to describe and distinguish the processes within the supply chain from the supplier's suppliers, to customer's customers. The model creates boundary sections of processes starting with the planning process, and then going through each process from each organisation within the supply chain, such as procurement of materials,

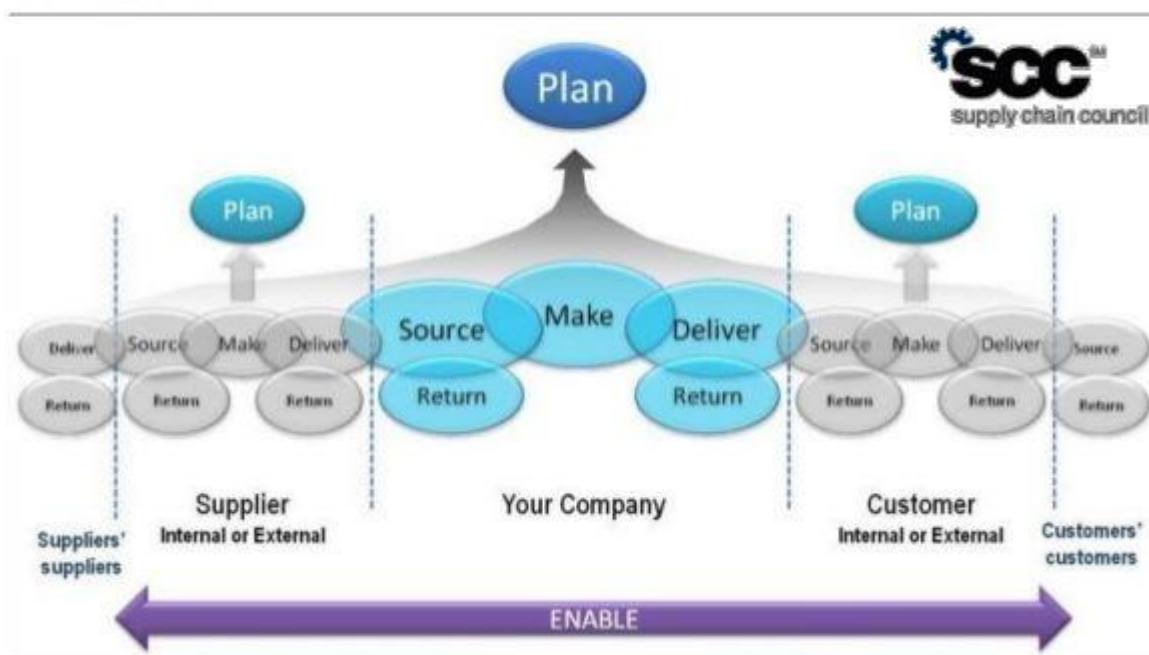
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manufacturing, deliveries and returns, (as seen in figure 1 below). The links between the processes are highlighted, the performance metrics are made available along with practices and the skills of the workforce, all integrated as one in a hierarchical type framework for excellence, linking and allowing greater interaction for users within the supply chain (Shapiro 2007) , (Apics 2018).

5.1 Figure 1

SCOR® Model

Through a world-wide recognized methodology covering the end-to-end Supply Chain : SCOR®



According to (SCRC 2004) the SCOR model is used to find problems within the supply chain, and mitigate the problems found to allow the smooth transfer of products between suppliers. The return on investment from using this model is usually between two to six times greater than before the model is implemented.

6.0 Economic order quantity model

According to (Rushton et al 2014) the economic order quantity (EOQ) method is a way of forecasting and scheduling inventory purchasing, and deliveries to efficiently arrive as and when needed to meet demand. This method can minimise the amount of stock holding within the supply chain network, to minimise the inventory holding costs of either raw materials, and finished goods. Holding stock is unavoidable in most cases because a buffer is often needed to cope with the fluctuations of supply and demand, furthermore stock needs to be held to make allowances for lead times and the EOQ is a way of keeping the bare-essentials in stock until the next delivery arrives to replenish inventory levels, however a continuous demand would still need to know the most efficient time for re-ordering, but this should always be at the same point throughout the year.

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7.0 Conclusion

After highlighting selected methods used for solving problems to create greater efficiencies within the supply chain, has highlighted the usefulness of models used by organisations in the supply chain, and how using them can create gains in increasing profit, optimising functions, help with decision making and reducing costs. The supply chain network design method, the heuristic method, the SCOR model, and the economic order quantity method was highlighted in this report, and all of them showed benefits as mentioned above.

8.0 References

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