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RESEARCH ARTICLE

A Study on Investigation of Influence of E-Commerce on Logistics Assessments and Supply Chain Engineering

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| ARTICLE INFO | ABSTRACT |
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| <p>Article History: Received 5th, May, 2015 Received in revised form 18th, May, 2015 Accepted 5th, June, 2015 Published online 20th, June, 2015</p> <p>Key words:</p> <p>Supply Chain Logistics E-Commerce</p> | <p>The rapid growth in e-commerce has not only influenced the buying nature of customers but also the way products are manufactured and delivered. The supply chain and logistics decisions influenced by e-commerce include demand forecasting, procurement, manufacturing system, inventory management, warehousing, transportation, distribution and reverse logistics. The success of any product based business depends on how they adapt to the latest paradigm shift of how, when, where and at what price a customer would like to buy a product. This paper analyses the supply chain and logistics decisions influenced by the rapidly growing sales through the e-commerce channel., distribution and reproduction in any medium, provided the original work is properly cited.</p> |

INTRODUCTION

Supply Chain Management (SCM) and Logistics Management (LM) are the backbones of everyday life by ensuring that products reach consumers at the right time in right quantity through the required channel (retail store, e-store, etc.). SCM deals with meeting the demand using supply while LM ensured the movement of the products from the supply point to the demand point. The goal of any supply chain and logistics decisions is to ensure that a product reaches the end consumer at the minimal possible cost. There has been ongoing research in supply chain and logistics for the past few decades to achieve this goal but mostly in a traditional supply chain network setup, where the network ends at a physical retail store. Hence, most

of the operational transactions from a supply chain perspective were business-to-business (B2B). However, with the launch of e-commerce channel, there has been an elimination of some retail stores. The customers have now become an integral part of the network and this has led to business-to-customer (B2C) transactions. This paradigm shift in supply chain network participants has led to changes in the way some of the supply chain decisions are taken. Supply chain and logistics research should now focus more on addressing these changes to ensure that there are no disruptions in the current operation and the business model becomes sustainable.

A Generic Literature Review

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There have been hundreds of scholarly materials published in the area of supply chain and logistics management. This section provides a generic review of key survey papers across different aspects of supply chain and logistics management to help the reader with a starting point for pursuing research. A supply chain strategy defines the business model for operating a supply chain to position a company in the market against its competitors. Each product could have its own supply chain strategy and the goal is to ensure increased supply chain surplus, i.e., increased revenue and decreased cost. Birhanu et al. (2014) identified different types of supply chain strategies available in the literature. Facility location is one of the important strategic supply chain decisions. There are various ways to model facility location in supply chain and many works have been published in this field. Melo et al. (2009) review the recent published articles related to facility location in supply chain. There are many ways a supply chain can be operated; engineer-to-order, buy-to-order, make-to-order, assemble-to-order, make-to-stock and ship-to-stock. Engineer-to-order supply chain involves the customer inputs right at the design stage. Gosling and Naim (2009) review the published materials related to engineer-to-order supply chains.

An agile supply chain is a dynamic alliance of member companies and has become increasingly important as means of achieving a competitive edge in rapidly changing business environments. Wu and Barnes (2011) used a classification framework to compare supply chain partner selection models in agile supply chains. Collaboration between the participants in a supply chain is important to ensure that there is a seamless flow of products and information. Lack of collaboration often leads to bullwhip effect, which is highly undesirable in a supply chain. Hudnurkar et al. (2014) review and classify published materials in the area of supply chain collaboration. Geary et al. (2006) critically reviewed the bullwhip effect in supply chains. Reverse logistics is the movement of product from the customer to the supplier in a supply chain. This movement is necessitated either with repairs or product returns as often seen in e-commerce purchases. Govindan

et al. (2015) provide a comprehensive review of published materials in the area of reverse logistics and closed loop supply chain. Managing supply chains in a sustainable manner has become an increasing concern and many companies have started to invest in sustainability. Seuring (2013) reviewed the modeling approaches for sustainable supply chain management and provided directions for future research. Brandenburg et al. (2014) provide a content analysis of published materials on quantitative models that address sustainability in the forward supply chain. Gupta and Palsule-Desai (2011) review published materials in sustainable supply chain to provide an understanding of issues and trade-offs involved.

Supply Chain and Logistics Decisions

The launch of e-commerce has changed the way supply chain and logistics decisions are made. The day is not far off when most of the physical retail stores would be forced to close due to their inability to compete in price with the e-commerce channel. Even with huge revenue generation through online sales, there is still more work needs to be done to reduce cost. Given that the list price is no longer a secret, the only way an e-commerce channel could really stay ahead in competition is to become competitive in the cost associated with supply chain and logistics decisions while selling and delivering the product to a customer. This section analyzes how the launch of e-commerce has changed the supply chain and logistics decisions.

Demand Forecasting

Demand forecasting traditionally had been both art and science, where a supply chain downstream participant's order becomes the input for the upstream participant to forecast demand. A lot of focus and research have gone into coordination and collaborative forecasting. Traditional supply chains had demand forecasting done at each participant level all the way from supplier of raw material to the retailer. However, with the launch of e-commerce, many retailers have ceased into existence and the down most participants of supply chain have now become more fragmented. Given the volatile and disaggregate buying behavior of

customers, data mining has now become a key tool for predicting the buying behavior of customers, which can later be extrapolated to the demand forecast at product level. In traditional supply chains, the work orders of retailers throttled the supply chain but now with e-commerce, the buying behavior of customers directly influences aggregate planning. A closed loop forecasting tool that could sense and predict the buying behavior of customers and then translate them to expected sales numbers of actual products would be the way ahead to adapt to the changes e-commerce has brought to demand forecasting.

Procurement

Traditional procurement of raw materials or finished goods went through a sealed tender process, which is done offline and took many weeks to complete. This process always kept the buyer in dark on what is the most competitive price available in the market. The launch of online reverse auction has changed the procurement scenario both for buyers and sellers by making it win-win to both of them. The concept of online reverse auction is also applied as forward auctions by the customers while buying products through e-commerce. Now the product pricing has become very competitive at all levels of supply chain and this has in a way helped in reducing the cost of producing and delivering a product to a customer. There could be instances in a supply chain where all participants are not going through the online reverse auction approach for purchasing. This could lead to increased cost of manufacturing and delivering the product to the customer. More research should be done to explore various avenues of using online reverse auction at each stage of the supply chain so that there is an overall decrease in cost of product.

Manufacturing

The manufacturing strategy of any product is a function of its demand and value; high value low demand product should be manufactured to order while low value high demand product should be manufactured to stock. However, there could many more combinations of value and demand as well as

other factors that decide a product's manufacturing strategy. The launch of e-commerce has altered the primary structure of operation of a supply chain, where the whole operation has become more of a pull based system. However, in contrast to it, the manufacturers cannot simply operate on a pull based system due to economy of scale. Traditionally, there were few products such as the thousands of shades of paints that were delivered to the end customer using postponement strategy. The same could not be applied to all products but there could be scope for some products where this strategy could be explored to some degree. For example, if postponement cannot be made till the retailer, it could be made till the assembly as seen in some of the computer sales. One key element for the success of this strategy is to make more and more parts/components that are common across many products. The success of this strategy lies in incorporating common components right at the engineering design stage of a product. While the traditional manufactured to order and manufactured to stock still holds good for many product, a hybrid postponement strategy is the key to reduce cost in an e-commerce setup. Research should happen both at the engineering design stage as well as at the operational level to facilitate postponement strategy.

Inventory Management

Inventory management is a time honored problem for many products as it is always difficult to predict the demand and lead times accurately. Traditionally, inventory was managed in a decentralized manner so that it is more responsive to customer demands. However, with the launch of e-commerce, there is no value in maintaining inventory at a customer's location as it makes more sense to keep it at a centralized location and ship the products to customer as and when required, which leads to direct reduction in inventory holding cost. This is the reason why retailers through the e-commerce channel are able to compete so well in terms of price for the same product since they pass on some of the savings in inventory holding cost to the end customer. There could be some risk in maintaining just one centralized location as some of the savings in holding cost could be offset by the

outbound transportation cost. More research needs to be done to identify the inventory strategy for the products sold through e-commerce channel.

Warehousing

Warehousing has been traditionally seen as a storage space either with the distributor or the retailer. With the launch of e-commerce, the role of a warehouse has significantly changed to become a fulfilment centre of customer orders. The new role of warehouse has made it larger in capacity and more centralized in operation but has also increased the outbound transportation cost since they are mostly at customer order level. With many e-commerce service providers shifting to a pure marketplace business model, where the sellers directly ship the products to the customer, the need for warehouse in such a supply chain system has to be examined. Any warehouse design is based on expected increase in storage volume as well as frequency at which the products have to be stored and retrieved. In a traditional warehouse setup at a distributor, its main purpose is for business-to-business transactions in bulk and has less product variety/types in storage. However, in an e-commerce warehouse, which serves as a fulfilment centre, the transactions are mostly at business-to-customer level with more product variety in storage. This entails a new approach for designing a warehouse and a traditional warehouse cannot be simply and immediately converted to an e-commerce warehouse.

Transportation and Distribution

Transportation and distribution enables supply chain decisions by ensuring that the product reaches the right destination at the right time in right quantity. In a traditional supply chain system, the distribution and transportation was done in bulk since it ends right at the retailers. However, with the e-commerce supply chain, there are no retailers, and distribution and transportation are done at individual customer order level and mostly with last-mile delivery. This results in higher unit transportation cost and the problem now focuses on how individual orders could be aggregated both over region and time. Transporting individual

customer orders has also increased the unit packaging costs. Research has to be done to come up with a distribution and transportation scheme that takes into consideration region and time aggregation as well as last-mile delivery. The marketplace business model followed by few e-commerce service providers has a highly decentralized inventory where the individual sellers ship products directly to customers. A distribution model where sellers located at two very different regions cross-filling their inventory for shipping a product could drastically reduce the outbound transportation cost.

Reverse Logistics

Reverse logistics is the movement of products from a customer to the supplier. Traditionally reverse logistics was associated with a defective product and the whole process was initiated either by the retailer or the service centre. However with the e-commerce channel, the individual customers have become the deciding authority for whether a product needs to be returned or not. This has not only increased the reverse logistics volume but also the complexity associated with it. Returns of electronics products add another dimension to the complexity as these products have a rapid reduction in their value with time. Hence, the sooner these products are returned, higher the value recovered. A new type of business where the refurbished products are sold again to customers at a discounted price have now come into existence. These developments have necessitated the need for developing models specifically for reverse logistics and closed loop supply chains.

Conclusions

Supply chain and logistics management have been researched for the past few decades. At a time when the research in this area looked little saturated, the launch of e-commerce has opened a plethora of research avenues. It is time that supply chain and logistics decisions are researched in the context of e-commerce as the future of most businesses dependent on e-commerce. Many qualitative factors play a role in e-commerce business models. Hence, the supply chain and

logistics research in the context of e-commerce should be both quantitative and qualitative. The price of a product is no longer the only deciding factor for a customer to buy a product through e-commerce. Revenue management through pricing models could be explored for extracting additional revenues from the products sold through e-commerce.

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