The Engineering Behind A Successful Supply Chain Management Strategy: An Insight Into Amazon.Com

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Abstract: Today is the era of E-Commerce. Almost every other individual is by some way or the other connected with the online business hubs. One thing to be noticed here is that the products available in these stores are being manufactured in different parts of the globe and subsequently are being supplied in different parts of the world. This network of effective procurement of products and distribution worldwide is basically called Supply Chain Management (SCM). This paper is an attempt to highlight the pivotal role SCM plays in any E-commerce retailing activity and also depict the way in which Amazon.com proper utilized this concept for its grand success ever since its inception and act as a market ruler. The data collected for the paper is basically secondary in nature which is taken from various sources, records, databases and research journals. It is expected that this paper would help to unleash the very significance of SCM in case of online retailing for effective performance in this cut throat competition era.

Key Words: Supply Chain Management, Online Retailing, Inventory, e-tailing, e-commerce, m-commerce, cyberspace.

1. INTRODUCTION

With the advancement in science and technology, the world has become a global village. Today, in fact, the world is taken away by the internet. Everything today seems to be only a few clicks away from us. In the context of commerce and business, technology seems to play a vital role for both the parties i.e. the organization as well the customer. People today are excessively busy in their regular workloads and can hardly desire to go for shopping. However, the desire to shop for goods is still pertinent. Ever since the late 20th century the role of internet has changed the functioning of the world. The effect of internet is constantly seeming to be booming in the business scenario ever since the early 2000s. E-Commerce is a modern form of business, which addresses the need of business organizations, vendors and customers at reduced cost, faster delivery and better quality. It aims at buying and selling of products and services in an electronic marketplace. It helps in paperless exchange of business-related information in a much convenient manner. It is generally done through-

- Electronic Data Exchange (EDI)
- Electronic Mail (e-mail)
- Electronic Bulletin Boards
- Electronic Fund Transfer (EFT)
- Other Network-based technologies

Like any other traditional market place, in an e-marketplace various buyers and sellers come together to conduct various transactions in the electronic space. Such platforms share similar functions to traditional market places like enabling free flow of information between buyers and sellers, provide payment gateways, provide services like customer support, reimbursement etc. It is therefore also called as e-tailing websites. Besides having sellers and buyers, products/services, there are certain things which are very necessary for a e-tailing website to function. They are-

i. Infrastructure – Infrastructure refers to the various databases, servers, software and electronic platforms where the transaction would take place. It is infact the base for an e-transaction.

ii. Front end – Front end refers to the ways through which the buyer and the seller interact. It may include for example- the seller’s portal, shopping cart, search engine, payment gateway etc.

iii. Back end – These are the operations that occur without the knowledge of the customers. These functions are very necessary for functioning of the business and includes the activities like inventory management, logistics etc.

iv. Intermediaries – These are the third parties that functions between the buyer and the seller. They try to equate both the parties by providing services like escrow and security.

<table>
<thead>
<tr>
<th>TABLE 1: COMPARISON BETWEEN TRADITIONAL AND ONLINE RETAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basis</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Procurement</td>
</tr>
<tr>
<td>Inventory Management</td>
</tr>
<tr>
<td>Warehouse Operations</td>
</tr>
<tr>
<td>Transport and Logistics</td>
</tr>
<tr>
<td>Post Sale Support</td>
</tr>
</tbody>
</table>

Supply Chain Management (SCM) is the phenomenon that manages supply activities to boost customer value and thereby achieve a competitive edge. In other words, it involves all the activities that range between procurement of raw materials from the suppliers to the delivery to the end users. It attempts to establish a connection between production, shipment and distribution of a product. By effective SCM, the
company gets the benefit of cutting down excessive costs and delivers products to the customer faster. This is done by maintaining a check over internal inventories, internal production, distribution, sales and the inventories of company vendors.

2. LITERATURE REVIEW:
Cohen, 2002 in his study analyses how different companies use supply chains to support their after-sales service operations. The author opines that supply chains must be designed with the utmost care and research and not just in the air. It should be done by analysing the basic products and their cost to the consumer. The paper also highlights the fact that the choice of location plays a dominant role when it comes to stocking the products for uniform supply. Cohen believes that the referred field is evolving with the growth of e-commerce because large scale optimisation is possible in real time by now. Dakduk et.al,2016 relates the theory of ‘Planned Behaviour’, ‘Reasoned Action’ and ‘Technology Acceptance Model’ in order to find the key determinants of online purchase behaviour of the internet users in Colombia. The study was conducted over 386 respondents ranging between the age group of 15-58 years of age using a structured questionnaire. The tools for analysis included Cronbach’s Alpha coefficient and exploratory factor analysis (SPSS 19.0). The authors use Bayesian Approach in this context. The findings of the study show that the intention to purchase online is mostly dependent on the attitudes of the customers towards the online shopping websites which are further explained by the perceived usefulness and ease of use of the site. Golicic et.al, 2002 studies the relationship between e-commerce and supply chain. The study is conducted by keeping alignment with the past researches about different companies and their reactions to uncertainty by developing and maintaining relationships among supply chain members. The methodology includes a survey of eight different e-commerce companies. It aims to find out the common thread about the influence of e-commerce on the management of supply chain relationship. The findings of the study opine the usage of ‘Transaction Cost Analysis’ and ‘The Resource Dependence Theory’. The authors sum up the study by stating that the e-commerce industry makes the business world more unpredictable and dynamic than before. Goyal, 2014 studies the perception of Indian customers towards online shopping. The study focuses on discovering the factors that induce online sales and also identify the loopholes in it. Furthermore, the study also aims to find out the most and the least popular categories of products that are purchased online. The paper finds out that though online shopping is growing rapidly, yet there are many cases where people find the deals online but prefer purchasing offline. The researcher also states there exist a reverse trend as well where people touch and feel the product offline but purchase it online. Gupta, 2015 makes a comparative study between offline and online shopping. The author makes the study in the district of Rourkela in Odisha. The main objective of the study is to identify the factors that motivate customers to decide whether to do online shopping or choose offline shopping. The study reveals that women are interested in online shopping than men are. There has been a growth in e-shopping since 2013 as the masses by then are more aware of the technology. Furthermore, the study finds that people from the age group 35 and above are reluctant to do online shopping because they are less aware of the technology. However, the respondents opined that they prefer purchasing online only if the prices of the products are less than the market price. Khanna and Sampat, 2015 in their study highlight the positive and negative impacts of online shopping in India. The study is mainly focused upon the customer attitude towards online shopping in the two most popular e-tailing websites of India v.i.z. Amazon and Flipkart during the festive seasons specifically Diwali. The authors also focus on the different strategies that Flipkart and Amazon adopt from time to time for gaining more customer base. The methodology adopted for the study is basically both primary and secondary. The primary data is collected using a structured questionnaire which is analysed based on SWOT analysis. The case study method was also used as a tool for analysis. The secondary data is however based on the various books, journals and research articles and press releases available. The authors find that customers feel it good to shop during festive seasons because of the attractive offers. However, internet traffic acts as a hindrance in many cases. They also highlighted various strategies adopted by both the companies in order to attract more and more customers specifically during the festive seasons.

3. OBJECTIVES
The objectives of the study can be highlighted as under:
1. To find the strategic importance of SCM in online retailing and its practical implications.
2. To study the engineering behind amazon’s supply chain management.
3. To check whether these techniques can be followed and adapted by other online retail business houses.

4. RESEARCH GAP
After an extensive literature review, the researcher finds out that there is a very minimal number of researches done in the field of amazon’s supply chain management. Additionally, the researcher did not come across any work on from Amazon’s supply chain management engineering perspective in the e-commerce industry. This study is thereby proposed to be one of its first kinds that would seem to investigate into the engineering behind the successful SCM of amazon.com and would also discuss the future potentiality in the e-tailing industry.

5. SIGNIFICANCE OF THE STUDY
This study is an insight into the engineering behind supply chain management of the e-commerce industry. It aims to check the phenomenon in context to Amazon. This paper tries to highlight the strategic importance of SCM in case of online retailing. Amazon has been remarkably successful ever since its inception has always been believed to have an excellent network of Supply. Its SCM policies have created milestones in the field of E-Commerce. It is therefore an attempt to bring to book those strategies and policies and look for whether there is any scope for other online business units to apply them for their success or not. Furthermore, the study shall also ponder upon the trends based on which e-commerce today has shifted from e-tailing to m-tailing.
6. METHODOLOGY
The present study is both descriptive and exploratory in nature. The methodology used in the paper in order to collect the information is basically secondary in nature. The information are being collected from the various sources like records, articles, research journals and databases. Information has also been collected from the different trustworthy websites in order to make the study more updated and accurate. Primary data is being avoided in the paper because the study is related to the internal management of the organization and thereby primary data collection becomes a very complicated, time consuming and expensive process due to geographical constraints.

7. ANALYSIS AND INTERPRETATION
During the initial years, Amazon had ten warehouses after adding six new warehouses which increased capacity became over five million square feet. They had fully computerized inventory system which led in the easy handling of inventory. Besides, during the holiday seasons Amazon uses to stock and pile up products they offer, to avoid customer disappointment. Product availability is a very significant factor that influences the customer loyalty. The customers always desire for a significant availability of the products as and when required. This availability influences customers whether to buy goods and services the next time from the same store or not. Based on this phenomenon, it is seen that Amazon.Com tries its best to maintain ample stock and also check to minimize the barriers of delivery system by managing its own inventory system.

In house Supply Chain:
It is popularly known as Online Only Supply Chain. Amazon is the best example for this approach. It relies on extensive product sales forecasting and inventory management systems to fulfill orders quickly at a high rate of accuracy while optimizing shipping to customers. This supply chain is extensively internal in nature. This helps Amazon to provide a clear and vivid variety in shopping options and excellent after sales services through its website.

Pros:
a) Maintains complete control
b) Enables operation based competitive advantage

Cons:
a) Large scale required to offset high fixed costs
b) Long learning curve before advantage may be realized.

However, as the first demerit suggests, maintaining a higher stock with oneself will automatically lead to higher expenses in holding that stock, Amazon too had to face the same consequences.

Fig. 1. Cost Responsiveness Efficient Frontier (Chopra & Meindl, 2007, p. 30)
The figure shows that when a company wants to increase its responsiveness, it should increase cost as a consequence. Besides, the stock that Amazon used to maintain in the initial age was based on speculations. Due to this, the company had to face a huge degree of uncertainty with inventory. Additionally, the higher amount of inventory holding increases the inventory cost and also led to higher depreciation. Another significant step that Amazon took in 1999 i.e. in the initial ages was locating more and more warehouses and locates them close to customers in order to reduce the response time

Fig. 2. Relationship between desired response time and number of facilities (Chopra & Meindl, 2007, p. 77)
The figure suggests that when a company wants to increase its responsiveness, it should increase cost as a consequence. However, Amazon did not pay much heed to this aspect at that time and therefore their facilities cost shot up like anything. Cost of one warehouse that Amazon managed during those days was about $50 million. It meant that they spent around $500 million in 1999, to manage the ten warehouses they controlled. However, Amazon decided to improve their inventory management and supply chain strategy:

- The very first change that they adopted was reducing their inventory and increasing the range of inventory. Reduction in the inventory let them to lower inventory management cost and increasing the range of inventories helped Amazon to increase their customer base.
- The second significant change they adopted was improving the inventory management performance
through location postponement. Here, inventory could be centralized in one strategic location where it can be transported to the desired locations as and when demand arises. It helped them to reduce their facilities cost.

• Ever since form its inception, Amazon was extremely in the opinion of not outsourcing its activities. Amazon was in the opinion that when a firm possesses its resources, then it should never try to depend on others for its activities. Though this consent was true to a great extent yet this was considered to be one of the greatest mistakes Amazon has ever committed unless it decided to take an innovative step. What Amazon did was it did not outsource inventory management of products which were popular or frequently purchased. Such inventory was being internally managed while the non-popular products were stocked by distributors who deliver the products as and when Amazon requested. They adopted this system because they felt that internet retailers should not allow other forms to hold inventory in supply chain as by not doing so they can provide optimal services to fulfill orders by locating the stock in their own facilities efficiently.

• Next what Amazon did was that it handled the orders by drop shipped inventory. Drop shipping is a supply chain management method in which the retailer does not keeps goods in stock but instead transfers customer orders and shipment details either to the manufacturer, another retailer or a wholesaler, who then ships the goods directly to the customer. An effective example in this context is Amazon’s alliance with Ingram Micro; a prominent wholesale dealer of electronic goods in order to fulfill the orders of desktops, laptops and other computer accessories. This strategic alliance helped Amazon not only to reduce the risk of holding larger inventory and reduction in the holding cost but also helped them to improve their goodwill because the companies that Amazon allied with had the best in class supply chain management.

• Besides these significant innovative steps, Amazon decided to sell the products of its competitors on its site. This helped Amazon to increase its product offering and also increase its availability. It made for the customers more convenient to find their required products and they need not to visit various other websites. The most interesting climax in this step was to provide a comparison of all the products from all the companies and provide the products of Amazon in comparatively lower prices that its competitors. Thus, customers developed an attitude that Amazon always used to set the prices reasonable.

Thus, Amazon was finally in a stage where it did not have to compromise on its profits either by losing customers or by incurring more costs.

Amazon’s Supply Chain Challenges:
Being the pioneer of online retailing, Amazon’s supply chain has to face a number of challenges. Though, many changes were being adopted, yet a number of challenges remain in the chain design, inventory segmentation, order sourcing, fulfillment and transportation. They can be enumerated as under-

• Amazon’s over expansion in the 1999 finally resulted in the elimination of the Distribution centers in Seattle, WA and McDonough, GA to cut the costs.

• Amazon’s decision to ally with 3rd parties need a strategic decision regarding which inventory to store in its facilities and which to be stored in upstream tiers in supply chain. It also needs decisions regarding which product should not be carried at all, but supplied by third party affiliate.

• On a per order basis, deciding which internal facility or external partner should be responsible for fulfilling the order is a challenge based on Amazon’s business model. Customers when placing an order expect a real time promised delivery date. But it becomes really difficult for Amazon for finding a low costing solution for picking up products from different internal or external facilities; pile them up together and then deliver them on the real promised date.

Amazon’s inventory segmentation:
Amazon’s inventory segmentation within its network can be highlighted in a three-tier system-The first phase here is obviously the Amazon.Com website and its IT system where there is the direct contact with customers which pass information to each tier in the supply chain. Subsequently, there exists an information flow from Tier 1 to Tier 3 and a physical flow of goods from Tier 3 to Tier 1.

Fig. 3. Amazon’s inventory segmentation.

Order Sourcing Decision - Re-Evaluating Real Time Decisions
When a customer places a order from Amazon.com, the website integrates with Amazon.Com’s order sourcing engine to determine which warehouse should ship the order. This decision occurs real-time and is aimed at minimizing transportation costs associated with that order. The information below is based on research conducted by Xu, Allgor, and Graves (2005). An example more clearly describes the value of re-evaluating fulfillment decisions. A customer in Cambridge, MA orders 1 CD from Amazon.com. This is Order 1 (O1). A few seconds later, a second customer orders the same CD and a book (O2). The CD is available from the New Castle, DE distribution center, but the book is not. The book is only located in the Coffeyville, KS facility. The CD in New Castle, DE is allocated to Order 1 (O1). Then, the second
order has to be split between the two distribution centers. This scenario requires 3 packages to get the 3 items to the 2 customers. If the assignment of orders to DCs were done at a later time, then both the CD and Book associated with Order 2 could be shipped together from the Delaware facility. This would reduce the number of shipments from 3 to 2, thus saving on transportation costs. The savings is based on a significant fixed cost component to parcel transportation. This is a simplistic example of the decision-making process. Sophisticated operations research models and IT capabilities need to be developed to implement these decisions at scale to reduce fulfillment and transportation costs without compromising the promised delivery date to the customer.

**Potentially and growth:**
M-commerce (or mobile commerce) is the buzzing trend. There was a time when internet could be accessed only in computers; but now things have changed. Smartphones have seemed to make things much more convenient. Almost all the businesses are now increasingly moving into cyber space. Customers, in the present-day scenario, have been observed to prefer mobile shopping not only for low-expense items such as everyday groceries but are also involved in purchasing high-involvement goods. With the growth in infrastructure development and more devices like Amazon Alexa, Google home etc. that can successfully connect to the IoT (Internet of Things), this trend shall create further buzz. Another great platform for new business models can be social media. This form of web media seems to be on a hype these days. Almost every second person is connected to social networking sites like twitter, facebook, instagram etc which provide a sound platform for the e-tailing websites to advertise their products and convey higher information. With the increase in consumption of digital products and services, mobile commerce seems to be a area that is equipped with much potential.

**7 SUGGESTIONS AND CONCLUSION:**
From the entire study it was therefore found that Amazon.Com being the first mover in online retailing had to face many challenges yet strived hard to maintain its glory. It had to face many ups and downs in its entire journey till date. However, its creative and innovative decisions marked up in golden letters and always set an example for other online retail organizations. It is been clearly seen that different online retail stores tend to fail in their business because of the common errors once Amazon committed. However, their lack of success motive or lack of innovative thinking they seem to swipe out of the market or sometimes exists in a very low position. However, if inspired by Amazon.Com, they can adapt the following techniques Amazon adopted for their success-

- Make sure that the supply chain managers have adequate knowledge and experience. They can provide a competitive advantage and play a big role in the company’s success.
- Adapt cost efficient measures for transportation as Amazon adapted. In other words, there should be efficient ways for reducing the shipping costs.
- Maintain a promised real-time delivery. Merely effectively holding the inventory won’t do well, but should aim at meeting the expectations of customers by on time delivery.
- Create contingency plans for domestic operations. Adequate and diversified stock should be maintained in this regard without actually increasing the holding cost.
- Optimum utilization of the resources available. However, outsourcing of certain activities should be done in order to focus on the core activities.
- Alliance with reputed 3rd parties can prove to be beneficial. However, here it is to be ensured that the contracts are being timely reviewed and updated as and when required.

Thus, it can be concluded in a nutshell that Amazon.Com has always laid maximum importance on its SCM. This is the aspect that most of the companies do not pay much priority to. As a result, though they set up with a bang, yet fail to sustain in the long run. This is worth commendable that being the first mover in the online retail segment, Amazon.Com till date possesses the same reputation and goodwill. Its customer base is highest amongst all the online retail stores which prove customer satisfaction. Thus, it can be interpreted that for the long term survival of an online retail store, SCM is a very significant aspect that has proved to be the bridge to success with Amazon as its best example.

**REFERENCES**

[9]. Introduction to Electronic Commerce and Social Commerce (4th Edition) – Efraim Turban, Judy Whiteside, David King, and Jon Outland
[10]. Amazon Disruption Symposium (2017) – Morgan Stanley Research