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**GLOBAL DEMAND CHAIN IN THE ELECTRONIC COMMERCE**

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## ABSTRACT

As the widely implementation of supply chain management (SCM), companies encounter unsolved problems while benefiting from SCM. There has been a research on demand chain management (DCM) that shows the new customer demand orientation will bring company more competitiveness to break through bottleneck. The purpose of this review is to illustrates the concept of demand chain and its advantages in e-commerce. Literature review and survey will be illustrated as the reference and the theory of this article is based on the literatures. A mode and a model of e-commerce demand chain will be detailed proposed and the ideas that how demand chain will work beneficially and efficiently. The mode focuses on the characteristics of demand chain in e-commerce, including customer management characteristics, supplier management characteristics, and logistics management characteristics. The model is a process of demand chain with information flow and material flow in e-commerce. Some other considerations about e-commerce demand chain and some remarkable problem with it are described with solutions. It is expected that the concept and model will make it desired for business corporations to give different and useful guides on transactions.

## KEYWORDS

Demand Chain Management, Supply Chain Management, Customer Demand, E-commerce

## INTRODUCTION

Over the past twenty-plus years, operating successfully requires organizations to become much more involved with suppliers and customers. As global markets expand and competition increases, Supply Chain Management (SCM) became more and more popular among corporations. The Council of Supply Chain Management Professionals (CSCMP) defines supply chain management as: "The planning and management of all activities involved in sourcing and procurement, conversation and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers and customers." With implementation among companies, the supply chain indeed reduced costs and improved quality and customer service, and with the end improving competitiveness. Besides the merit of supply chain, there are still several common problems. The inventory is always surplus or deficit, which costs huge money. In the U.S., businesses spent \$2.269 trillion on inventory carrying costs (which include interest, taxes, obsolescence, depreciation, insurance and warehousing) while total retail sales in the US topped \$4.53 trillion in 2013, according to the Council of Supply Chain Management Professionals' (CSCMP) Annual State of Logistics Report and emarketer. And at the same time, globally averagely 8.2% consumers cannot purchase the products they desire, based on the research. In retail industry, there was still a stock-out rate at 6.5%, and even after considering the alternative products, the net stock-out rate reached 3.1%. From the data, it is apparently that the warehousing cost became a factor that is dysfunctional and should not be ignored any more. Apart from this, there are other problems bothering corporations. The efficiency in corporation is not high enough because of the vague borders between departments and responsibility. The social loaf phenomenon did great damage to companies.

And at the same time, technology development and globalization has totally rebuilt the concept of trading. Therefore, the resource became surplus for the easier access to the services and raw material globally. Quality of products is better for technology, so that the quality is not the only initial factor to be competitive. With internet popularization and the emergence of E-commerce, customer can show their demand directly and more efficiently. In the *Direct from Dell* of Michael Dell, it is implicated that the influence of market changing on corporate transformation and transition is always lagging. The truly determinant factor is consumers' demand. The fastest response to customers' demand with accuracy will become competitive in current circumstances. The implementation of supply chain is not enough to reply to demand in time, and this is the emergence reason of Demand Chain and Demand Chain Management (DCM).

The concept of demand chain is raised by Michael E. Porter, a professor of Bishop William Lawrence University of Harvard, involving marketing, sale, service, distribution, promotion and etc. According to Porter's theory, both

demand chain and supply chain are components of value chain, which is a systematically value-added activity from raw material to end products in consumers' hands. Demand chain is the opposite position to supply chain, which is the downstream in value chain. The DCM refers to management on the information systems that provide direct input to the supply chain to optimize sales channel performance. The aim of DCM is to match demand to available capacity and reduce more cost, especially on inventory waste costs, and meet customers' needs precisely and timely. Because in the e-commerce, responses are rapidly and demands are changeable, and marketing department can get the updated information in time. DCM system can improve the corporation reaction to be faster significantly. It is crucial to pay attention on DCM as same importantly as SCM.

The successful implement of demand chain management is the *zero inventory* in TOYOTA company, as well known as just-in-time production or the Toyota production system (TPS). In 1950s, TOYOTA company realized that although the car production mode in the US is developed enough, they could not just copy directly. A new idea of small batch lean production was put forward. From then on, the JIT system has spread to all the world, which aimed primarily at reducing flow times within production system as well as response times from suppliers and to customers. JIT system saved huge inventory amount, reduced labor time and total corporation costs, and improved production efficiency. The core philosophy of JIT is to eliminate any invalid labor and waste. The extreme attention on customer demand and total quality management bring TOYOTA vast benefits. And it should be used to benefit all companies, of whom the model will be explained in followings.

## LITERATURE REVIEW

In this section, several relevant literatures that pertain to demand chain and DCM within e-commerce will be briefly presented.

### *Supply chain and demand chain*

Lee, H., Peleg, B., & Whang S. J. (2005) studied on the demand chain in TOYOTA, considered that the TOYOTA demand chain is flexible, customer oriented and product specific and efficient. The study did research on how TOYOTA take advantages of its developed distribution channels, inventory management, planning methodologies, and production capabilities to create and manage its demand chain, focusing on Japanese and the North American markets. The matching demand and supply improved the efficiency significantly. By using Toyota Pruis and the Scion product lines, the research demonstrate how Toyota adjusts its demand chain to fit a particular product and its target customers.

Hilletoth, P., & Ericsson, D. (2007) argue that there is a need for a new generation of logistics management with the change of environment. By combining logistics and demand chain management, the paper advocate that the new management philosophy identifies consumers and their demand as the starting point for all value chain activities. Through case studies, it has been found that DCM philosophy will not merely facilitate the development of logistics but rather an integration of marketing and supply chain operations. In the volatile and consumer-oriented environment, it requires higher levels of customized products, faster product development, and commercialization together with all parties along demand chain and supply chain.

Canever, M. D., et. al. (2008) delineated the emergence of demand chain management from a theoretical perspective and illustrate its occurrence in practice. Through the case study on beef chain in the state of Rio Grande do Sul (Brazil), finding that the DCM is derived from SCM but on market orientation perspective, where the supply chain emphasizes on supply and production orientation.

Bustinza, O. F., Parry, G. C., & Herrero, F. V. (2013) had researched into the effect of adding services to product of offerings in supply chain and demand chain. The purpose of that paper is to make it clear that how firms manage their product and service if they integrating the SCM and DCM. Through survey, questionnaire and structural equation modelling (SEM), the paper has found that the management of the services value chain, where the customers' role as value creator is a central feature of the construct, and better served by integration of the customer orientation of DCM.

Kovtun, V., Giloni, A., & Hurvich, C. (2014) shows study about assessing the value of demand chain in supply chains, assuming that each supply chain player limits its best linear forecast of the leadtime demand and uses it to determine the order quantity. In the paper, they demonstrate how a typical supply chain player can influence the extent of its available information in the presence of demand chain through studying the properties of the moving average polynomials of adjacent supply chain players. And it is illustrated that the study how a player can determine its available information under demand sharing and use the information to forecast precisely to show the importance of information sharing among downstream in demand chain.

Santos, J. B., & Antone S. D. (2014) proposed a critical view of demand chain management. The paper leveraged the existing theories on interfaces between intra-firm departments to identify the dimensions of demand supply alignment and map the drivers, enablers and consequences on carrying out those alignments. The outcomes will be used to improve the idea the DCM.

### *Demand chain in e-commerce*

Lee, H. L. & Whang S. J. (2004) illustrated the impact of e-business on supply chain integration can be described along the dimensions of information integration, synchronized planning, coordinated workflow, and new business models. The paper founds that many core supply chain concepts and principles can be carried out to practice more efficiently by e-business, creating huge value.

Seethamraju, R. (2014) investigates the adoption of demand chain management in Australian organizations with cross-sectional qualitative field study. The paper found that the adoption is constrained by the organizational capability and sound digital platforms. The paper also provides solutions that adopting the DCM initiatives such as market intelligence mechanism, will help organizations to become agile and control simultaneously.

Vasista, T. G. K., & AlAbdullatif, A. M. (2017) proposed a proactive analytic approach on electronic customer relationship management (CRM) in DCM. Currently, the collaborative business supply chain environment required to be proactive rather than reactive to deal with the uncertainty. In the paper, it is addressed that how predictive analytics helps in constructing the knowledge base to conduct verification and validation in demand chain management.

## **PROPOSED DEMAND CHAIN MANAGEMENT MODE IN E-COMMERCE**

In e-commerce, quite a lot business activities about supply and marketing are operated online. The essence of e-commerce transaction is the virtual companies finding customers and their demand and resources through Internet e-commerce channel, process and transform, and delivery to consumer's hand in finished goods form.

The characteristics of DCM in e-commerce can be concluded as follows:

1. Customer management. Customer management is the core content. E-commerce corporations have to restructure internal process and systems based on "customer-driven" philosophy. A quick response and unimpeded communication system should be set up. It is apparent that improvement of management on customer information and demand to attract and maintain more customers should be the priority of demand chain.

Difference between customer relationship in supply chain and demand chain:

<b>Customer relationship in SCM</b>	<b>Customer relationship in DCM</b>
Focus on major customers	Focus on both majority and personalized customers
Short-term	Long-term
Limited customer involved	Abundant customer involved
Moderate customer relationship	High intensity customer relationship
One-way communication	Both ways communication
Popular customer information	Popular and individualized customer information
Production-orientation	Customer-orientation

**Table 1** Differences about customer relationship between SCM and DCM

The characteristics of e-commerce customer management are:

- a. Faster information delivery speed, which bring company first-hand information about customers' preference. And the communication is direct. Through Internet communication, e-mail, Facebook, WhatsApp, line, WeChat and so on, the distance between company and customer are closer, so does the relationship. This makes real time communication more convenient and getting feedback immediately. In e-commerce background, the customer service can be simplified significantly, which also brings benefits to both firms and customers.
- b. E-commerce realizes the remote service and automatic service. This function extends the market to anywhere worldwide has access to Internet.
- c. There is no doubt that automatic service makes it possible for 24-hour communication, and the remote service should be 24-hour because of the different time zone. And on the other hand, customers can get information through firm website anytime they want. These make sure the continuous production and transaction, which promote the customer service quality.
- d. The more important fact is that e-commerce facilitates the information system remarkably, it generates the information management standardization. Through e-commerce, all information internal and external can be gathered into database. The customer information will be integrated into all company transactions and shared in the whole company. It must be admitted that this will reduce the cost of internal information transmitting and information distortion.

The better performance on customer management in e-commerce demand chain will establish better interaction relationship with customers, keeping competitive edge in the changing and fierce competition.

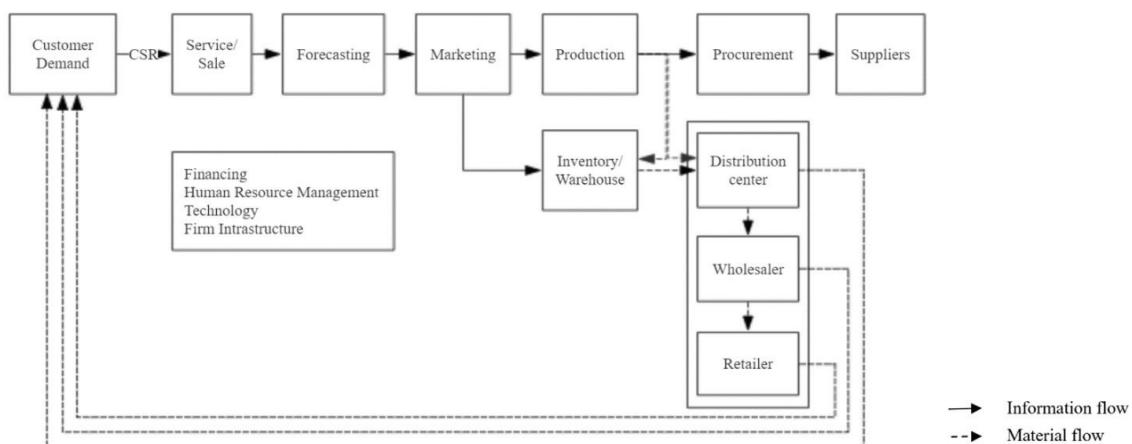
2. Supplier management. Supplier is a party that provides desired resources (production, raw material, WIP, machine or energy) for company. The supplier quality is the determinate element for company's production activities and the response speed toward customers' needs in DCM. A perfect and smooth supplier system is the foundation of prompt and accurate quality procurement. The supply management in e-commerce has characteristics as follows:

- a. Possess abundant global supplier resource and the supplier list makes certain that company can get desired resource promptly, such as raw material and components.
- b. Having access to qualified supplier with reputation will reduce the procurement risks and bring down the inventory cost and operation cost. Because inventories may represent a significant portion of total assets, a reduction of inventories can result in a significant increase in ROI.
- c. It is evident that e-commerce integrates all suppliers' information into database and manage suppliers' performance through measure lead time, product quality, price and service and so on. Classify the suppliers to different categories and choose outstanding suppliers will drop the purchasing cost observably.
- d. The implementation of electronic procurement systems (EDI), is the derived purchasing system from e-commerce. The Internet-based e-procurement system have changed the infrastructure requirement, making it readily affordable to most firms. It is time saving, cost saving, accuracy increase, real time and trackability, and benefit to the suppliers.

3. Logistics management. Logistics is the process that plans, implements and controls the efficient, effective forwards and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements, based on the official definition. Including transportation, warehousing, and information system, logistics plays very significant roles in the value chain.

- a. In e-commerce, there are software applications include transportation management systems, warehouse management systems and global trade management systems, which can be added to ERP software suites of applications. Companies typically find significant benefits with these logistics execution systems.
- b. The technology used in logistics management fostered the efficiency quite a lot by GPS implement and developed tracking system, which improved customer service apparently. And the tracking system make it possible to react rapidly to accident during delivery.
- c. It has been observed that a large amount of e-commerce firm are SME, who has less customers and production than traditional large company. The less products and sales is not suit for building specialized own warehouse or distribution center (DC). It is more economic that share distribution center with other SMEs by consolidation and reclassification to the inventories. This reasonable shared distribution center mode decreased the logistics cost greatly and enhanced utilization of resource like truck, labor and fuel.

This section is the proposed model of demand chain management in e-commerce. In the high speed transaction in e-commerce transactions, a clear process model for information and material flow is indispensable for organization to develop. The model is inspired by value chain and supply chain model, which position all parties on the chain and their responsibilities. This new model emphasizes the information flow of demand-oriented input and the material flow of zero inventory strategy. The purposes for this model are: (1) to illustrate the process of information and material transmitting direction in demand chain; (2) to provide a model to compare with and improve for the firms that established demand chain already; (3) to be used as criteria for performance measurement for each link; (4) to integrate the demand information into enterprise information system, in order to adjust production with demand.



**Figure 1** Proposed Model of Demand Chain Management

In the model, all begin from the customer demand, through CSR and any communication method such like survey, questionnaire or interview form to get as much as possible demand information. The implicated information can also come from the service and sale every day, though the information from existing sale volume is a little hysteretic, but the actual sale and service can be used as persuasive basis for forecasting. Enough precise data from all channels determines the accuracy of forecast, which is the most important and tough link within this model. Only the precise forecast can lead to appropriate inventory, production and procurement. Forecasting method like linear trend, linear regression, exponential smoothing or seasonal forecasting methods can be adopted. When having the specific forecasting

result, the marketing department can arrange for the sale or service. The products may delivery from the company warehouse or new production according to the situation of company, but the successful zero inventory will not allow product at any stage (raw material, WIP, finished products) be stocked too much into warehouse. Considering the reality and the difficulty to achieve zero inventory, small amount of safety stock will wait in the warehouse or distribution center, while reduce the unnecessary stocks on the other hand. If a new production is activated, the desired material information will be sent to procurement department as soon as possible. Purchasing department will place order to cooperated suppliers to get raw materials. The finished goods after production will be stored in warehouse or delivery to distribution center for next sale. Distribution center dispatch products to wholesaler and wholesaler distributes to retailers, depending on their delivery contract. Then the next sale happens, and meets the customers' demand. A demand chain activity cycle has finished.

Knowledge of calculus perspective can be used after the detailed description. If all information and material process are done quickly with efficiency, where the e-commerce can make sure the speed, all the goods will be dynamic within demand chain, which means the information analyzing and transmitting time are equal to the material delivery time. It will be continuous sales and information input. This is exactly the philosophy of zero inventory and JIT system.

With this model and appropriate excitation, there must be huge benefits to the firms. The more sale without stock-out or surplus will reduce total cost significantly, leading to advantage edge and competitiveness. And utility of resource will be improved, so it will be environmentally friendlier. The most crucial part is the forecasting link. To this model, how to get the precise information and accurate forecasting result is vital.

## OTHER CONSIDERATIONS ON DEMAND CHAIN IN E-COMMERCE

It should be added that although demand chain management will bring huge benefit, there are still unavoidable problems under e-commerce background. Exactly because of the fast speed on reaction and information spreading in e-commerce, the Bullwhip Effect will be magnified. If there is any error at the beginning of information flow, it will be amplified terribly at the end of information flow. It must be pointed out that the precise forecasting is indispensable to demand chain to weaken the bullwhip effect. The solution is information sharing. Systems such as VMI and vertical integration of all parties on demand chain can eliminate the bullwhip effect to some extent. Another consideration about demand chain is that the theory is based on rationale corporation and people, it is known that people in reality will not so rational as theory. Not all of the parties keep the same interest on demand chain, some are conflict with each other. In many circumstances, not all companies keep stocks depends on actual demand strictly. Oppositely, some of them have speculative strategy. If wholesaler and retailer notice the increase trend on demand, they are likely to purchase large amount of product, so that they can depress the price of suppliers. It will cause high inventory cost apparently. The speculative activity will do huge damage to the demand chain. On this occasion, a deeper trust among demand chain parties is necessary, enhance the cooperation and enlarge market with joint effort.

## CONCLUSION AND RECOMMENDATION

To conclude, the theory, mode and model in this article is an overview of demand chain management in e-commerce. Through the literature review, the idea of demand chain management has been considered an excellent tool to reducing cost and improves competitiveness simultaneously. Not as SCM is already popular worldwide and used widely, demand chain focus on the customer side, while SCM emphasizes on supply to production side. Implement the proposed model and mode will help forms identify the need to establish demand chain and improve demand chain performance. The idea of this paper is that both of SCM and DCM should be combined and operate to integrate as parts of value chain to maximize company's strength and benefits and cater to customers' demand as much as possible. DCM changed the conventional supply chain leading by production pushing management into demand pulling management, and can be used as a basis for management of customer relationship. It should be made clear that there are two sides of demand chain, companies in e-commerce are supposed to take good advantage of its beneficial functions and mitigate the problem in demand chain. Take good advantage of demand chain in e-commerce will achieve zero inventory and promote the capital turnover.

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