INVESTIGATING BULLWHIP EFFECT ON SUPPLY CHAIN PERFORMANCE OF SELECTED PRODUCTS OF BUSINESS

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Abstract
The main problems of supply chain is the lack of proper communication and timely its components, and uncertainty existence in supply and demand that causes disrupting the correct decisions about the amount and production time that this lack of coordination will be caused accumulation of inventory or risks arising from inability to meet the demands in manufacturing company that ultimately will led to the poor performance of the supply chain and to lose customers. The approach of this study is investigating factors causing bullwhip effect as a most important factor of uncertainty in supply and demand.

Keywords: Bullwhip Effect, Supply Chain Performance, Products, Business

1. Introduction
In the 1950s and 1960s in producing was the greatest emphasis on mass production. So the manufacturers can reduce their costs to a minimum. Thus flexibility and changes in production processes were very difficult and costly and therefore producing new products was almost impossible. As well as manufacturers don’t have a nice view to customers and suppliers so that communication and sharing information with them knew the high risks.
In the 1980s, with increasing global competition, companies found need to reduce costs and intense competition, increasing quality and greater flexibility, so to JIT (Just in Time) and turned to the initiative. They realized the importance of a close relationship with the supplier. Thus new concepts such as Supply Chain Management (SCM) emerged because able to form most successfully this relationship. Rapid change and uncertainty in the markets has been caused that organizations recognition which they are members of the supply chain and the role that they play an extremely important (Ghasemi, 2010).

2. Literature Review
2.1. Supply Chain Management
A supply chain consists of all stages involved, directly or indirectly to meet a customer request. The supply chain aren’t only includes the manufacturer and suppliers, but also are included departments of transportation, warehouses, retailers and their customers (Najafi;Zanjirani Farahani, 2007).
In this respect, the attitude of supply chain management are considered strong strategy to increase the competitiveness of companies and their supply chains, thus, after introduction of the term supply chain management by Mr. Oliver and Webber in 1982, expanded considerably in the application of this approach is emerged and this belief exist in organizations that competition was not only known between the organizations and supply chains compete with each other (Talebzadeh, 2008). Supply chain management was introduced in the late 1980s and widely used in the 1990s. Before this date, the phrase "logistics" and "operational management" was used. Supply chain management is coordinating production, inventory, place, and situation of the transport chain components in order to achieve the best combination of responsiveness and efficiency for the target market (Ghasemi, 2010). The two main components of a supply chain are integration of organizational units within supply chain and synchronization of process within chain. Studies have shown that companies that keep pace with advances of information technology integrated their processes to quickly respond to market changes and have more flexibility (Ganeshan, ;Terry, 1995).

2.2. Formation process of Supply Chain Management
Concept of supply chain management is a combination of five steps management. The first stage domestic logistics field, the second stage , approach toward logistics from decentralization organization was changed to focus on basic functions that is arise from new approach related to optimizing cost and customer service. In the third stage expanded dramatically logistics supply and addition spread storage and internal transportation, internal operations relationship with the functional areas of business partners. In the fourth stage concept of logistics changed also to supply chain management. Nowadays by information technology applications in supply chain management can say that the supply chain management is entering in the fifth stage means electronic supply chain management (Moghadasi, 2011).

2.3. Effective Factors affecting on the growth of supply chain management
Most important predisposing factors for the development of supply chain management include:

- Competitive pressures, such as reduced product life cycle, new products, new competitors, the bargaining power of buyers and suppliers.
- Outsourcing: current organization strong is tendency to find goods and supplies from other firms instead of to be able to produce and invest in this area.
- Globalization: with emergence of this phenomenon organization is trying to stronger in the World Trade to develop their value chain.
- Need to improve the process, new issues such as the timely production system, lean production and total quality management need to use supply chain benefits.
- Inventory management: procurement of inventory and timely their delivery to production line needed to coordination and accuracy cycle to guide the inventory (Tabibi & et al,2011).
2.4. Types of Supply Chain
In some traditional manufacturing companies goods save after manufacturing in warehouse that this would complicate the supply chain, because if a company uses a business model manufacturing based on order there is no need to store products. So it is clear that Supply chains depend on the nature of the company. Types of the supply chain can be cited as follows:
1. Cumulative manufacturing to save
2. Continue saving
3. Manufacture to order
4. Channel assembly
5. Global supply chain (Feiz Abadi, 2003)

2.5. Supply Chain Management Processes
In term of Handfield view (1999) supply chain management includes three main processes which are as follows:
– Information Management;
– Logistics Management;
– Relationship management (Talebzadeh, 2008).

On the other hand, "Cooper" and "Lambert" in 1996, the key processes in the supply chain knew nine following categories:
- Product flow
- Customer Relationship Management
- Customer service management
- Demand Management
- Order fulfillment
- Manufacturing flow management
- Supplier relationship management
- Product development and commercialization
- Returns management (Hugos, 2003).

2.6. Structural elements framework of supply chain
For the design and implementation of supply chain is need that the elements design based on the balance between to meet the customer requirements and efficient in order to achieve a competitive advantage for the entire supply chain.
1. Competitive Strategy: Competitive strategy of organization is defines set of customer requirements that must be met by the organization products.
2. Supply chain strategy: after understanding characteristics of target customers, should understand the characteristics and supply chain strategies that are responsive to customers. It should be noted that should exist coordination between competitive strategy and supply chain strategy.
3. Elements of the supply chain: after supply chain determine the strategy comes to making decisions about how to achieve goal of desired and increasing supply chain performance in terms of responsiveness power and cost. These factors can be categorized in four groups as follows: facilities, inventory, transportation, information (Ezati, 1997).

2.7. Supply Chain Problems
In the supply chain with traditional communications any actor (each company or chain members) to manage their inventory and ordering activities, the distribution and other activities related to its products are responsive. In other words, the company towards inventory, distribution and product order related to their company, know themselves responsibility and are not involved in the activities of the same type relate to their supplier companies and retailers (Najafi; Zanjirani Farahani, 2007). Problems in the supply chain with traditional communications generally come from two sources:
1. Uncertainty: a major source of uncertainty supply chain is to forecast demand. Demand forecast is affected several factors such as competition, prices, current conditions and general level of customers commitment. Another factor the uncertainty of supply chain is delivery time that it is depend on such as a car failure ratio in linear manufacturing process, traffic congestion where involved in the transport and quality problems of materials that may cause production delays.
2. Lack of coordination; these types of problems occur when a company does not have a good relationship with other departments. 1. When the message is incomprehensible to business partners, and when some of the companies departments are not aware of some issues or too late from what is required or what should happen to become aware (Disney, Towill, 2003).

2.8. Bullwhip Effect in Supply Chain
For better performance of supply chains are done different activities and is used the specific methods in order to integrate the supply chain members. Including important factors that has a great influence on performance of supply chains is fluctuates on demand throughout the chain. This phenomenon is known in terms bullwhip effect. Forrester first time in about 45 years ago, without using bullwhip effect and just by industry dynamic approach noted to this phenomenon. So implementing logistics units in company "Procter & Gamble" was tested ordering patterns for one of the best products. In this study reveals that retail sales of product have changes and high volatility that these changes are not so sure. When volatility examined, results was very surprising. These changes that did not seem too logical, was known to bullwhip effect. Exactly the same process as in company "Hewlett-Packard" after the sale showed in one of printer models in this company (Hoberg, 2007).

2.9. Relationship between Bullwhip Effect and Supply Chain Costs
Cost of bull whip effect is felt by all members of the supply chain. Producing capacity for the flood of orders has increased much more than the effective demand. Distributors received additional inventory to fluctuations of the order. Due to need for additional transport capacity to periods of high demand increases the cost of transport. In addition to transportation costs, labor costs also increased to meet the high demand courses. Retailers are facing problems
about the unavailability of products and a long delivery time. In periods with high demand, there is a period that available capacity of products in the supply chain cannot meet orders. This issue is caused by the ration of product, longer periods of supply order, and lost sales due to inventory shortages (Ghasemi, 2010).

Bullwhip effect is lead to unsustainable production plans. These programs make range from unnecessary costs in the supply chain. Companies are forced to deal with highly variable demand invest in excess capacity.

2.10. Causes of Bullwhip Effect

Disney and ta’wil as well as Lee and colleagues (2003) conducted fundamental research in this area which identified four main reasons:

1. Timely demand forecast: two effect of demand signal processing and delivery time of nonzero together called "strengthening demand" or "Forrester effect". This effect of feedback theory shows that how by decisions, changes, and predictions can also be controlled and create instability in the system.

2. Order batching: or the Burbidge refers to the impact of ordering in batches. This effect in order to achieve economic size occurs in setting activities frequently.

3. Price variation: it is known to "advance effect" or "promotion". The purpose of this factor is lowering prices to stimulate demand. Customers by using this opportunity purchase sooner. But when a discounts program stop, reduced demand is considered as a factor to stimulate demand for future discounts.

4. Rationing and gaming: it is known “Houlihan” or “Flywheel”. In this effect, customer order exceeds the amount needed to avoid shortages or incomplete delivery in chain (Makui & et al, 2007; Makui & et al,2009).

2.11. Supply Chain Performance

After industry managers concluded that to provide fast, cheap and high quality products and their services to customers and global markets have in dire need to an efficient supply chain management, measuring the performance of the entire supply chain and each of its members separately will need to improve it. To implement a performance evaluation system, establish and define appropriate indicators in different levels of the supply chain is essential (Cooper & et al, 1997).

Performance measurement plays a decisive role in the development of a supply chain. As can design and supply chain management will lead to the desired performance. Performance measures and indicators related to it play the important role in the classification of purposes, and performance evaluation and determining future policy (Lee & et al, 1997). The purpose of supply chain performance is manufacturing products with lower cost and timely delivery of products to customers and increase customer satisfaction (Malihi, 2005).

2.12. Introduction to Model of SCOR (Supply Chain Operation Reference)

Scor model is a reference model process-based. Means this model offers elements of processes, leading indicators and techniques and characteristics associated with elements of
supply chain management in a unique format. Using this model allows companies to communicate with each other and by creating common understanding throughout supply chain and the use of superior technology offer acceptable performance (Cooper & et al, 1997). However, Scor model don’t attempt to describe processes such as marketing and sales, development of technology and research, development of products and some components after sales service of customer. Scor also in education, information technology quality, management except (SCM) consider, but it does not mention directly to them (Cooper & et al, 1997). This model includes four main activities of management as the following:

- Planning
- Sourcing
- Making
- Delivery

2.13. The main activities of Scor Model
Scor model is composed based on five distinct management activities:
1. Planning: process related to the balance with supply and demand for developing work, for suitability compliance with sourcing needs and production and delivery.
2. Sourcing processes for acquisition of goods and services to meet planned or effective demand.
3. Manufacturing processes of product delivery to the final position to meet effective demand or planned product.
4. Delivery: processes related to prepare the product / service to satisfy effective demand or planned.
5. Return: processes related to restore goods or receiving returned products for any reason (Lee & et al, 1997).

2.14. Strengths and weaknesses of Scor Model
Some of the strengths of this model are:
- structured methodology for strategic and operational objectives and outcomes research to identify opportunities for business improvement
- Best business resource for supply chain management
- Models and standards framework of supply chain process reference

Some weaknesses of this model are:
- Insufficient training and development in organization
- Lack of analytical tools of cause and effect and problem solving in the macro-level
- Insufficient tools, methodologies or techniques to implement projects identified by Scor
- Poor infrastructure of planning for organizing and managing simultaneously project activities (Kuncova, 2000).
3. Conclusion
Because of the extremely high volume of activities related to the production of a product is done by an external organization of company, with changes in demand and fluctuations in it activities of chain members also somewhat reduced. It may be due to the increasing in demand due to the rapid response and not losing customers, resources activities is done with lower quality and cannot respond to orders in proper time to providing appropriate quality of demand ordered by supply resource and in fact, the level of flexibility reduced that sample studied also supplying source elasticity is medium and low and in resulting bullwhip effect will reduced efficiency and effectiveness of the sourcing process. Also lack of relationship between forecast demand and sourcing can be explained as follows that even with sources with high capabilities such as quality, fast delivery, technical support, etc, updated demand forecast error will be prevented effective demand customers, because this factor increases the gap between predicted demand with effective demand

4. Suggestions
- The use of POS (Point of Sale) throughout supply chain.
- The use of inventory management by seller to monitor inventories by manufacturer
- The use of political “reducing everyday prices” to avoid price fluctuations
- The use of information systems such as ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management)
- To Decline orders set of electronic data interchange can reduce ordering costs.
- Improving planning process and providing raw materials of organization
- Increasing educational level of workforce in supply chain
- Creating a shared vision throughout the supply chain

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