Bulletin of the *Transilvania* University of Braşov • Vol. 4 (53) •No. 2 - 2011
Series V: Economic Sciences

SUPPLY CHAIN COMPONENTS

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Abstract: *In this article I will go through three main logistics components, which are represented by: transportation, inventory and facilities, and the three secondary logistical components: information, production location, price and how they determine performance of any supply chain. I will discuss then how these components are used in the design, planning and operation of a supply chain. I will also talk about some obstacles a supply chain manager may encounter.*

Key words: *logistics, transportation, inventory, facilities.*

1. Introduction

To understand how a company can improve its supply chain performance in terms of response and efficiency, we need to examine primary and secondary components of the chain: transportation, inventory, facilities, information, location of production and price. These components interact with each other to determine supply chain performance in terms of response and efficiency. As a result the structure of these components determines whether and how they can be used strategically in a supply chain.

2. Supply chain components

First I will define each direction separately and will discuss their impact on supply chain:

2.1. Facilities

Facilities are actually physical location in the supply chain where product is stored, assembled or manufactured. The two major types of facilities are: the place of production and storage location. Decisions concerning the role, location, capacity and flexibility of these features have a significant impact on supply chain performance. For example, an auto parts distributor may have multiple warehouses located closer to customers, who will increase the response time but it will reduce efficiency.

The facilities are those responding the question "Where?" when talking about the supply chain. These are locations where the product or where stock is moved. In such a facility the stock is being transformed in another state or stored. Companies can gain scale economies when the product is created or stored in a single location, this centralization reducing costs. However this reduction in costs comes at the expense of response times as many customers of the company may be located remote from the production site. The inverse situation is also correct: if the company has several production sites and storage it will be closer to its customers but

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will increase the costs of production and storage.

Example Toyota and Honda are currently two companies that are striving to be closer to their customers by opening as many production units and storage operating in all markets.

There are three ways that you can take a company in terms of facilities: to be flexible, to be specialized or a combination of both. The first one refers to the fact that the warehouse and production unit of production and storage offers a wide variety of products. If a company chooses this option will benefit from a wide range of products close to customers but the cost of this decision is high. The second option is cheaper but the main disadvantage is that they do not offer a wide range of products.

In the case of deposits their managers must decide whether their role will be transit or storage. If transit deposits cargo is unloaded, dissolved in small batches and then loaded onto trucks and transported to their final destination.

Factors to be taken into account when the company decides the location of its facilities are: workers quality, the cost of workers, the cost of construction, infrastructure, proximity to customers, the location of other facilities of the company, the rates and other macroeconomic factors.

Another important decision that concerns a company's managers is the deposit capacity. Large capacity storage is very flexible, allowing easy handling of goods and also allows for storing a wide variety of products. The disadvantage of such a deposit is the huge costs involved in maintaining such a repository as well as other difficulties such as those related to infrastructure.

In conclusion when deciding on a company's facilities the manager must weigh on one hand the cost and number of facilities, location and type and on the other hand the response time of these facilities.

2.2 Inventory

Inventory contains all the raw materials for products and finished goods in the supply chain. Changing storage policy can dramatically affect the response time and efficiency of a supply chain. For example, a clothing vendor can create smaller response times by making larger stocks and satisfying customer demand from stock. However, a large stock increases retailer costs thereby making it less effective, reducing stock helps retailer efficiency but reduce response time. Inventory is in the supply chain due to a mismatch between demand and supply. This disparity is intentionally at a steel producer for whom is more economical to produce in large quantities and then to store them for later sale. An important role inventory plays in supply chain is to satisfy customers requests when they need it. Another important role is that of reducing costs through scale economies.

Inventory is found along the supply chain as raw materials, finished goods or materials in the manufacturing process. The stock is a major source of cost and has a great impact on response time. A retailer with a huge stock will soon be able to satisfy almost any customer requirement when a customer of a retailer with lower inventories will have to wait a period of time to take possession of the desired product. The stock also has a great impact on material flow time. That is time that the material goes through from entering the supply chain to the exit.

Inventory plays an important role in the ability of a supply chain to help a company's competitive strategy. If a company's competitive strategy requires a

small response time that, that small business can reduce response time by relocating a huge stock closer to customers. However a company can also use the stock to become more efficient by reducing inventory through a centralized storage strategy. In this way, that company can be positioned as a company with low prices. Despite higher costs more and more companies opt for a bigger inventory strategy and this is mainly due to two factors: safety and seasonality. To ensure that they will have the product all the time many companies create security stocks.

For example Nordstrom's competitive strategy is based on high-end customers with quality requirements. Their customers are willing to pay more to get the desired product when they want. To support this competitive strategy Nordstrom is using stock, company storing a large variety and quantity of products to avoid stock outs. Actually Nordstrom store a much higher inventory than other stores of this kind. Nordstrom is priced higher due to very high stock, but on the other side wins because its customers are willing to pay for the high level of services that Nordstrom can ensure because of its inventory.

2.3. Transportation

Transportation includes moving stock from one location to another along the supply chain. Transportation may take the form of various combinations of routes and modes each with their own performance and features. The choice of transport is of particular importance to the efficiency and response time of the supply chain. For example, a company based on sales through the catalog can use faster methods of transport such as FedEx to send products, so making the supply chain have less time but also less effective due to high costs caused by use of FedEx services.

For example, Dell has decided to carry some of its products from Asia to America by air. This way the company can meet customer demands in time and additional costs involved in air transportation from the ship are set off by the lack of inventory.

Or the company can use a cheaper and slower carrier to send their goods making products more efficient in terms of cost but this will increase response time.

Nowadays the choice of how to transport has become one of the most important strategic decisions for a company. The reasons are many but among the most important are: cost, duration, quality, infrastructure, political situation etc. Once with the increasing fuel price transportation costs begin to be felt more and more in the final cost of the product so that a company must to decide which mode of transport (air, sea, road, rail, pipeline, and telecommunications) is most appropriate.

2.4. Information

Information is data and analysis regarding the facilities, inventory, transportation, costs, prices and reviews along the supply chain. Information is the most important components directly affect the chain because each of the other components. Information management provides the opportunity to make more efficient supply chain in terms of cost and response time.

For example, information about customer buying behavior of a pharmaceutical company can produce and store medications in anticipation of consumer demand which makes the chain very quickly, in most cases their clients by finding drugs they need. This information about the application may also make supply chain more effective as the pharmaceutical company will be able to forecast demand and to produce only the

quantity required. This information can help us better choose the most efficient mode of transport both in terms of cost and time. Such information link different sections of the supply chain allowing them to coordinate and thus to increase efficiency.

Example: Andersen Windows

Andersen Windows is a manufacturer of wood windows located in Bayport, Minnesota, which has invested in a computer system that allows customers to provide customized products at very shot time. By using this system called "Smart Windows" clients can choose from a library of over 50,000 components that can be combined in any way by the customer and then shows them exactly how it looks like. The payment is also automatically and the order is send to the factory if the customer decides to buy. This system greatly streamlines the sales process and production and also enables the customer to buy exactly what he wants.

A major problem faced by managers when they have to make decisions on this part of the supply chain is cost. Nowadays information is very expensive and hard to find. To always have fresh and useful information companies need to invest large amounts especially in infrastructure and specialists recruitment.

For example Dell takes orders directly from customers via telephone or Internet. Building the direct channel required serious investment but the results quickly appeared. Dell can deliver products very quickly and also know well ahead of other PC manufacturers what is the trend of the market and adapt their strategies much easier. Because of this system performance Dell is the company with the lowest response time and also due to efficient management and good cooperation with their suppliers, Dell can provide its customers the lowest price on the market.

2.5. Location

One of the most important decisions is the choice of the production location. At the strategic level this decision determines which functions of the business are performed local and which are outsourced. Once Motorola has relocated part of their production in China costs have decreased but the response time has suffered from long distance. To recover this increase in time Motorola has started to carry some cell phones from China by air although this choice increased transport costs. Flextronics, an electronics manufacturer hopes to provide efficient localization in terms of cost and response time. They try to build production facilities in the U.S. to be close to their customers while maintaining other facilities to countries with lower costs.

For each outsourced task firm must decide whether to use a single provider or more. If it will appeal at many providers then the role and responsibilities of each must be well definite. The decision to outsource certain tasks has to be taken only after a cost analysis to see whether the firm is more efficient to perform that task itself.

For e*xample Cisco has outsourced most of the production. Their strategy is to outsource a range of differentiated products. Thus, for products such as routers for home users, the production was outsourced to China and from there the products are then shipped worldwide. These products have the advantage of being cheap even if they are of low quality. For the professional product range Cisco has outsourced production in the U.S. These products are not cheap but are excellent in terms of quality and are recognized as such.*

Decisions on the location of production must be taken to increase the profit of the supply chain. Total profits are influenced by the location of production impact on sales, service, production costs, inventory costs, transportation costs, information costs and not least the company's image. We must not forget that most companies decided to outsource production to countries in Asia where production costs are lower but many people are reluctant to buy products from these countries as they consider this product are weak in terms of quality

2.6. Price

Price is the sum required by a firm specializing in supplying goods and services along the supply chain. For example customers who place more value on time would be willing to pay more just to have the product sooner while others are wiling to wait more time for a product only because this way the price will be lower. Orders made in advance are much less likely if the price does not vary according to reserve time.

Price influences consumer segments that will buy the product and the expectations of these consumers. When they purchase a product with high price, customers will expect to find a high quality product and a lot of additional services, of course depending on the product. The price may be adjusted to make the difference between demand and supply. Short-term price reductions can help to eliminate old stocks and rising prices reduce demand for certain products that the company does not have inventory in such large numbers.

For example Amazon offers its customers a wide range of prices for all categories. For example in 2009 for a book that costs $ 30, for shipping company offered the following prices: one day delivery $ 20, delivery within 2 days $ 11, $ 5 for 3-5 days delivery, free delivery in 7-14 days. In this way those who want a lower response time had to pay more for the desired product while those who wore not interested by time could get the product at a much lower price or even with free delivery. Amazon also has special offers for Christmas starting in November; these offerings are designed to decongestion the busy period from December. So if someone wants to buy Christmas gifts in November they will be delivered free of charge while for those bought in December the price increase as Christmas approaches.

3. The components frame

It is important to realize that these components do not act independently but interact with each other to determine supply chain performance. The figure below illustrates how these components interact in the supply chain.

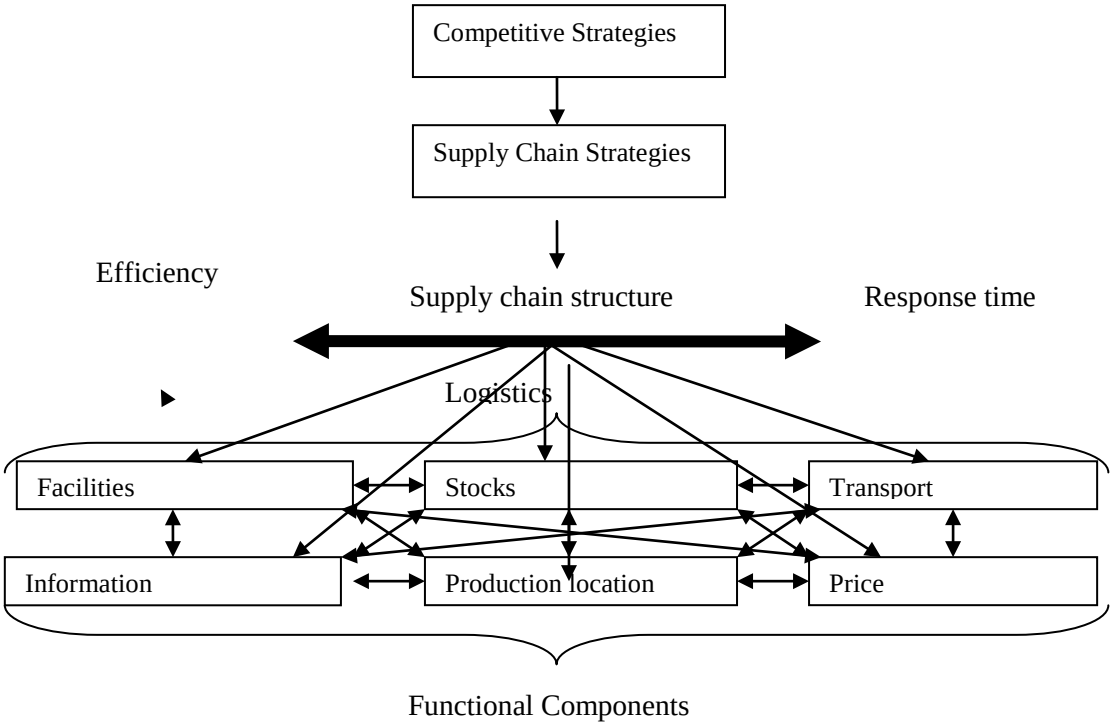

Fig. 1. *Image of supply chain structure*

Many companies start with a competitive strategy and then decide how it should be their supply chain. Supply chain strategy determines how it should look the supply chain to be effective both the for cost and response time. Although this framework is usually seen from above, often, a study of the six components may indicate the need to change something in the supply chain strategy and perhaps even competitive.

Acknowledgement

This paper is supported by the Sectoral Operation Programme Human Resources Development (SOP HRD), ID76945 financed from the European Social Fund and by the Romanian Government

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