THE INFLUENCE OF PRODUCTION SYSTEMS IN POSTPONEMENT MAKE-TO-STOCK WITH SEASONAL DEMAND

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ABSTRACT

The supply chain management, postponement and demand management functions are of strategic importance to the economic success of organizations because they influence the production process, but when viewed in isolation it may hinder understanding of their behavior. The aim of this paper is to analyze the influence of the postponement in an enterprise production system with make-to-stock and with seasonal demand. The research method used was a case study; the instruments of data collection were semi-structured interviews, documentary analysis and site visits. As a way to support the research on the analysis of case study and the final considerations, the following issues will be discussed: supply chain management, postponement, demand management system and make-to-stock.

Keywords: Postponement, Supply Chain Management, Demand Management, make-to-stock.

1 INTRODUCTION

Organizations today must be concerned not only with their production, with demand for its products by the consumer market and its supply chain, as this tripod cannot create differential in relation to its competitors. This difference that the consumer is always looking for and demanding they are: price, quality and availability.
How to reduce production costs without affecting the quality and availability of product on the market? From the inventory postponement strategy. This strategy coupled with the management may allow a reduction in product cost, since this is talking about reducing the risk of loss of finished product as it has a high added value, increased flexibility in adapting to market needs.

According to Edalatkhah (2006), in the new economy, supply chains are needed to address various markets around the world, set up delivery of customized products, planning for change, never together with speed and precision considered possible before. Managers need to work with various partners to monitor the activities being performed together, in order to solve problems and delays that may occur.

According to “The Global Supply Chain Forum”, the supply chain management is the integration of key processes, from consumers to producers of raw materials. SCM involves many areas such as demand forecasting, procurement, manufacturing, distribution, inventory and transport, interacting prospects strategic, tactical and operational (MCADAM; MCCORMACK, 2001).

According to Tan (2002), the GCS involves the integration of business processes through the supply chain, including the coordination of activities and processes not only within an organization alone, but of all that make up the supply chain.

According to Nascimento Neto and Oliveira and Ghinato (2002), the Collaborative Planning, Forecasting, and Replenishment (CPFR) is a tool to facilitate collaborative planning among the participating companies through the reduction in inventory levels, combined with improved service levels, with In order to address issues such as: the influence of promotions on sales forecast and inventory management, influences of changes in the pattern of demand, supply inventory to ensure availability of products on the shelf, to enable greater coordination between enterprises in the chain, allowing
greater synchronization between the various processes in the industrial manufacturing processes and forecasting.

The CPFR can be defined as a set of rules and procedures by the Voluntary Interindustry Commerce Standards (VICS) committee was founded in 1986 with the aim of increasing the efficiency of supply chains, specifically the retail sector, these standards that aim to facilitate physical and information flows (NASCIMENTO NETO; OLIVEIRA; GHINATO, 2002).

To Rodrigues and Oliveira (2009) the demand management is a practice that allows you to manage and coordinate the supply chain in reverse, i.e. the consumer to the supplier, in which consumers trigger actions for the supply of products making the production system.

According to Widiarta and Berghen (2004), there are several assumptions that must be considered in the modeling of demand management:

a) There is no possibility of coordinated replenishment. It is assumed that all suppliers are sorted independently;

b) It is assumed that demand is stochastic and independent manner with a known probability distribution;

c) The parameters are stationary. The parameters in our systems are updated occasionally and the general trend in demand for the product is more constant;

d) There are multiple items with limited storage capacity. Storage limitation is represented by the number of available palettes and shelves for those that can be used on a particular item;
e) The demand is seasonal in some cases. The demand for a product finished the month with a large percentage of zero values (often 30 percent or more), with values greater than zero, randomly mixed;

f) The replenishment time is always constant during a predetermined period. Therefore, if two or more replenishment orders are simultaneously outstanding, they should be processed in the same order in which they are placed. In another word, it may not cross;

g) There is no quantity discount with regards to the number of quantity ordered by the company;

h) There is only one point providing. The products are provided at the same place and share a common facility inventory.

This activity manages the integration between the supplier, the business and consumer, is responsible for proper planning of all the demands generated, external or internal, with the aim of which has a balance between what the supplier can deliver, production can and what the market needs (FAVARETTO, 2001).

According to Rodrigues and Oliveira (2009), in MTS the product has started its production based on demand forecast. The arrival of the application causes your service almost immediately. It is suitable for products with predictable demand, and may have high inventory cost.

Darú and Lacerda (2005) described that manufacture for stock is a common practice, where one can forecast demand, and can enjoy moments of the crop to be produced, using resources better and more balanced way of loading. But this policy has some disadvantages, which would be the high cost of storage and the difficulty of predicting what will sell.
According to Van Hock and Dierdonck (2000), Verol (2006) and Zang and Tan (2010), the concept of postponement is that risk and uncertainty are the costs of the differentiation (form, place or time) of products that occurs during activities such as manufacturing, warehousing and delivery. It is based on the characteristics of product/process in the supply chain: (a) product design: the specific content of the operation postponed (delayed), (b) process: the time when the activities are delayed in the process, and (c) place: the location where the delay happens.

Ng e Chung (2008) commented that the strategic placement of the decoupling point the supply chain, the strategy of postponement can be used. The purpose of the postponement is to increase the efficiency of the supply chain, moving product differentiation (at the point of dissociation) closer to the end user. Because the risk and uncertainty are the costs of goods differentiation and differentiation could occur in the product itself and/or the geographical dispersion of inventories.

2 CASE STUDY

In order to carry out the case study, interviews were conducted with the industrial director, industrial unit managers and PCP manager, on-site visits were made and documents were analyzed.

The company has a linear layout, large-lot production, low rates of production flexibility and skilled workers.

It currently works with four product categories, each with its own particularities with regard to intermediate inventory management. They are: daily planners, school products, office materials and household materials.

The complexity of the production processes is very high. The company has approximately 1000 different models for 2008, which are divided as shown in Table 1.
These products are not managed in a single manner because the company developed a planning approach per product category and respects the seasonality of and criticalness of each category.

Two ways are adopted to plan production. The first is through the planning of in-process materials, inventories, production schedules, production times, among others. The second is through the variation in line dedication to a specific category of product, for example, sewn, spiral-bound and bound product line, thus being able to differentiate production and models according to lines, for example, a daily planner is made with several sections, and sewn along the sides.

A few years ago, the company adopted an ERP for business management where the main objective was to integrate all company operations: the administrative, financial, human resource, commercial, marketing, PCP, storeroom and production areas.

Table 1: List of quantities of models per product

<table>
<thead>
<tr>
<th>Product Line</th>
<th>Quantity of models</th>
<th>Share %</th>
</tr>
</thead>
<tbody>
<tr>
<td>School</td>
<td>450</td>
<td>46.20</td>
</tr>
<tr>
<td>Office</td>
<td>240</td>
<td>24.64</td>
</tr>
<tr>
<td>Daily Planners</td>
<td>104</td>
<td>10.68</td>
</tr>
<tr>
<td>Home</td>
<td>180</td>
<td>18.48</td>
</tr>
</tbody>
</table>
The company has a production method and times study team that has been modernizing setup procedures, schedules and composition of raw materials aimed at reducing losses.

Definition of production cycles is based on the ABC classification of products, inventory turnover, raw material inventory, intermediate inventory and impact on cost.

The ABC classification proved to be appropriate for product categories that have low seasonality, where the items classified as A have high inventory levels, a great impact on production and monthly replacement cycles. Items classified as B have average inventory levels, less impact on productions and bi-monthly replacement cycles. Items classified as C have lower inventory levels, low impact on productions and quarterly replacement cycles.

The ABC classification method had to be improved for products with accentuated seasonality due to the back-to-school consumption peak in Brazil (JAN, FEB and MAR), since demand is not continuous. Thus, the main element taken into account for production scheduling is the volume to be produced.

As a result of the 3 to 6 week turnover, raw material and in-process inventory is for a short time in relation to Brazilian reality. FIFO (first in, first out) is used for physical management and inventory accounting. The company works with push production, in other words, it produces for inventory.

In order to request the purchase of inputs, the PCP team takes into account the quantity of existing raw materials, production capacity, what needs to be produced and in what time. Another team dedicates itself to sales projections.

From the general sales plan, capacity and critical resources, the PCP elaborates a monthly production plan with the best production schedule.
Monthly planning is broken down into four weeks. This details the materials to be used and defines the manufacturing schedules and possible gaps.

The organization uses CPFR as a tool for collaboration between departments, suppliers and customers in stage 1, distributors and retailers, "as a way to improve information flow and thereby share the risks of market uncertainty.

The criteria for postponement of the stocks of raw materials following the reverse flow of logistics, i.e., from consumer to supplier. In which the organization seeks to study the market demand, noting some variables: age group of consumers, social class, geographic region, time for shopping, etc.

Based on the variables listed above and on information from the departments of marketing, international relations, production, supply, sales, shipping, warehouse, financial, controllership and PCP, executives enter into an agreement on what, how, when and how to produce.

From these definitions the distribution team starts the study area for the storage of finished product, finished product shipping between industry and distribution center located approximately 15 km of distance, time of storage of the product and how it should be given growth volume of the finished product in days.

Based on the study by distributing the production begins the definition script for production, the production period, the amount of raw material that will be needed in the course of the period, as should be given to supply the production line, where should be stored the parts that make up the final product and what should be the destination of the finished product and waste generated.

Teams supplies, PCP, warehouse should define together with suppliers of level 1, as should be the delivery of raw material, i.e., quality time, "a weekly, biweekly or monthly
and cost to meet the specifications imposed by customers of a level which was passed on the distribution and production.

Another criterion used by the team of supplies is the use of ABC classification for finished products and therefore to raw materials, thus it reduces the risk of failure and therefore can stop the production line. This classification follows two criteria, they are: how many products a particular feedstock serves and what its impact on the production of the same and what value-added product, i.e. the larger more profitable.

The team has supplies to make a survey of possible suppliers to their degree of reliability, location, delivery period which should be passed on to the financial district that will study the financial health of the prospective supplier, in order to avoid surprises as the delivery raw material, requests for advance payment, etc.

3 CONCLUSIONS

The method of deciding on the degree of postponement of the stocks of raw material and finished product can be improved, since the decisions are tied to executives' feeling about the attitude of the consumer market.

Another critical noticed is that CPFR can be being mismanaged since it was observed that there are no methods to validate the information passed by the client and supplier level 1.

This form can occur and the appropriateness of the departments of production and a need that does not exist, or even predictions of postponement on-estimated because the suppliers can inform a reality of mistaken delivery.

The PCP team could have a more comprehensive as its collaboration among departments and influence in defining the ABC classification of products, creating benchmarks and measuring productivity and the postponement of stocks.
As a way to improve forecasting of demand, the tool could be adopted Vendor Management Inventory (VMI), allowing you to create the practice of consignment of goods to the customer level and a joint administration of stocks and thus further reducing the risk of uncertainty.

As a complement to CPFR and VMI, could be adopted, the Quick Response (QR) that allow the practice of encouraging customers to exercise a level of effective management of supply chain and thereby improve order management, inventory replenishment, handling and transportation, and exchange of information and thereby enabling lower costs and improve levels of delay.

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