

A Study on Effective Inventory Management practices in a Yarn Manufacturing Facility in Tamil Nadu

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Abstract:

Inventory management is a challenging area in supply chain management of any business, especially in the manufacturing or production industry. Organisations need to have inventories in warehouses to fulfil customer demand, meanwhile, these inventories incur holding costs to the organisations. Therefore, effective inventory management is needed to find and maintain the right levels of the inventories that will fulfil the demand without incurring the unnecessary cost to the company and to avoid overstocks. This paper gives a brief introduction to the concepts of the inventory management, overview of the yarn manufacturing (spinning) industry, a real-time case study of the implementation of effective inventory management techniques in one of the yarn manufacturing mills and the difference observed in the performance of the mill in terms inventory turnover ratio and inventory conversion period, and the reflective analysis of the implementation of the effective inventory management.

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I. INTRODUCTION

Inventory or stock is the goods and materials that a firm holds for various purposes. Inventory management is about specifying the aspect and organisation of stocked goods. It is required at different locations within a facility or within many locations of a supply network to precede the regular and planned course of production and stock of materials. Just-in-time manufacturing is a methodology aimed primarily at reducing the time associated with the production system and response times from suppliers and to customers.

II. LITERATURE REVIEW

Prabavathi. V and Vanathi. R(2019) were of the view that the integral part of Textile industry is Supply Chain Management(SCM). In addition to traditional concepts on improving production efficiency and quality control, Supply chain management also focuses on improving the synergy and interaction among different companies in the supply chain to satisfy the business demands.

Ishhaq Bhatti (2013) maintained that Customer satisfaction, Delivery reliability, and Social performance have a concrete impact on overall performance in the textile industry and allow organisations to gain a

competitive advantage in the textile sector.

Lord (2004) stated that the yarn manufacturing industry has shown a lot of improvement in recent years. With the latest innovation, it is possible to achieve high-quality yarn, which is not possible earlier because in earlier times there was no equipment available to obtain the required product. Also, the high-quality yarn, like a glass, is so fragile that it requires special care, which cannot be achieved by the equipment available earlier.

Alexander (2003) opened that though Ring spinning was introduced earlier to open-end and Rotor spinning gained popularity during the 90s, Ring spinning remains competitive to Ring Spinning in yarn manufacturing.

Reid and Sanders (2012) felt that the goals of inventory management are to render satisfying levels of customer satisfaction and to reduce investments exercised in inventory. In extension to above mentioned two purposes, other objectives for inventory management are; to reduce inventory freighting expenses, to optimize investments for inventory on satisfactory level, to reduce ordering costs for inventory, and to ensure the supply of input raw material and finalised products will be sustained to ensure that manufacturing processes are not stopped and always meeting demands of the customers.

Devine(2010)felt that the application of software to aid the Inventory management has a lot of constraints. The first and foremost of the constraint is software being very expensive. Also, the software would have a lot of complexities and would require a lot of training.

Gerald M. Meier, (1966), in his work on the problem of limited economic development, described that greater availability of resources alone would not increase the industrialisation process. Proper utilisation of resources is also required.

Usman (2014) identified that companies that bring innovative changes in every sector of the organisations, including warehouses, gain an advantage in the market by gaining a significant growth rate compared to companies that rely more on traditional practices.

Shetty (2011) was of the view that poor management of resources and lack of modern infrastructure contribute to undermining the textile industry in the global market.

Madanhire and Mbohwa (2016) found that JIT is a viewpoint that can be related to every manufacturing industry, which plans to dispose of waste, since waste produced from any action adds costs to the process without adding to value to the element being produced.

Regardless of the great benefits related to JIT, the viewpoint also has its various restrictions. Ansah (2016) maintains that one of the main factors that lead to the unsuccessful implementation of JIT is a cultural difference. This is because changing and adapting to new organisational change is hard for some organisations. Most organisations still followed traditional methods for handling material. These organisations load up stock to meet supply in periods of high demand. Organisations with such behaviour usually face problems with the use of JIT. Alterations in procedures for problem-solving. Resilient to change within the organisation to adopt, appreciate and acknowledge JIT principles and practices. Employees need to have multiple skills to apply JIT, which include being flexible.

Suzaki (1989) was of the view that there are three principal objectives in applying Just In Time. These objectives were identified as the means to enhance the ability of the organisations to compete in the market and to remain competitive over the long run. Also, these objectives help to increase the degree of efficiency in the production process and reduce the waste, declining time, and effort involved in the process. These objectives can give a valuable assessment, which helps us to identify the particular purposes of applying JIT. JIT, a philosophy

developed in past, has gone through various transformation phase to a philosophy that is applicable in every sector, service and manufacturing alike. Table 1 below shows and contrasts some of the differences between the traditional techniques of material handling and the JIT technique.

Table 1 – Comparison between Traditional Technique and JIT

Traditional System / Technique	Just In Time (JIT)
Push system	Pull System
Significant Inventories	Insignificant or zero inventories
Process structure	Manufacturing cells
Specialised Labour	Multifunction labour
Complex accounting	Simple Cost Accounting

Silver (1998) found that buffer stock as the average amount of inventory kept in stock to handle the unprecedented demand in sales and to handle the peak situation when getting raw materials from suppliers would be difficult.

Liberopoulos et al. (2003) stated that in a case when the supply is too limited, Buffer stock and security lead time can be interchangeable.

2.1. Inventory Management

Inventory management is the administration of non-capitalized assets (inventory) and stock items. Inventory management, a segment of supply chain management, manages the flow of goods from manufacturers to warehouses and from warehouses to sale. One of the important function of inventory management is to keep a comprehensive record of every new or returned product while it enters or leaves a warehouse to sale.

Inventory is an idle stock of physical goods that contain the financial value, and are held in various forms by industry in its custody anticipating packing, processing, transformation, and use or sale in a future point of time.

Any organisation which is into production and sales will necessarily hold stock of different physical resources to support future consumption and sale.

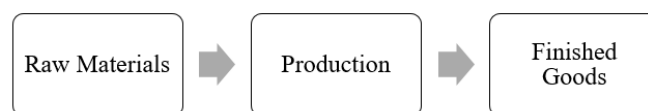


Figure 1 Showing the production of raw material into finished goods

2.2. Different Types of Inventory

Inventories of materials are recorded at various stages of a process and departments of an organisation. A manufacturing organisation needs inventories to maintain the production process. Finished goods are held at the plant, stores, distribution centres, etc.

Both raw materials and finished goods that are in transit at various locations form a part of the inventory. Finished goods inventory is held by the organisation at various stocking points or with dealers until it reaches the market and end customers.

Along with raw materials and finished goods, organisations also hold spare parts to maintain the products. Defective products, defective parts, and scraps also form a part of the inventory, as long as these items are inventoried in the books of the company and have economic value.

2.3. Yarn Manufacturing Industry / Spinning Industry

Spinning is the process of twisting together of drawn-out strands of fibers to form yarn. Spinning occupies a major part in the overall textile industry. The yarn produced from the spinning process is then used to produce textile/fabric, which is then used to make clothing and many other products. There are several industrial processes available to spin yarn, as well as hand-spinning techniques, where the fiber is drawn out, twisted, and wound onto a cone.

There are various types of industrial spinning. One such type is Ring Spinning, which is used extensively across the textile industry. Ring Spinning is a method of spinning fibers, such as cotton, to produce yarn. Ring Spinning takes cotton as its input and produces yarn as its output. Cotton is usually taken in the form of bale, which weighs approximately 150 kg per bale. The waste produced in the process of yarn production can be used as an input for another type of spinning called Open End Spinning.

The sequential processes involved in the Ring Spinning, from Mixing to Cone Winding, are as in figure 2 below:

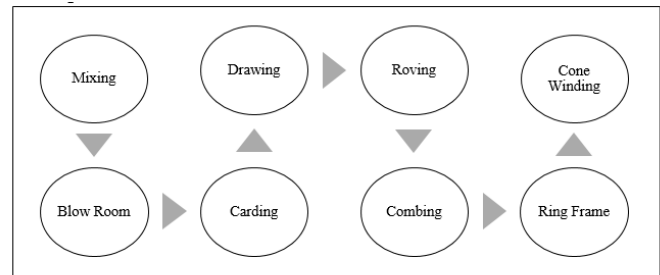


Figure 2 - Processes involved in Ring Spinning

2.4. Inventory Management in Spinning Industry

The store is the place where every type of raw materials, spares, finished goods are kept in the proper system. Inventory control means the accurate calculation and data of every type of raw materials, spares and finished goods in time to time store. Inventory control in the spinning industry is necessary because:

- i. To recognise the required amount of raw material;
- ii. To know about the job no which would be processed;
- iii. To continue the production process without any stoppage;
- iv. To find out the profit or loss of a company;

There are various types of inventory management techniques that can be followed in the spinning mills. One such appropriate technique is Just In Time(JIT). Compared to the traditional approaches of the inventory techniques, as JIT offers several advantages.

2.5. Just In Time (JIT)

Just-in-time (JIT) manufacturing, also known as just-in-time production, is a method aimed principally at reducing times within production systems as well as response times from suppliers and to customers. It originally referred to the production of goods as to meet customer demand precisely, in time, quality and quantity, whether the 'customer' is the final obtainer of the product or another process further along the production line.

Cheng (1996) maintains that the main objective of JIT is to help the organisation to sustain an advantage over its competitors. JIT achieves this by focusing primarily on customers and delivering a performance that is extremely superior to competitors while keeping the cost of production at the minimum level, and continuously improving quality. Advantage generated by JIT makes it

as widely used inventory management tool and successful over the years.

Juárez, et al. (2017) were of the view that JIT helps in enhancing the business by applying fundamental leadership, operations research, and diverse point models, each identified with systems and activities. Enhancement sparkles the light on the importance of JIT practice in business, which depends on the commitment to enhance the money.

Hay(1988) felt that “over the years, the application of JIT has been effective and efficient within the manufacturing entities globally. This has led to the philosophy being adopted and implemented within the service industries”.

The successful implementation and accomplishment of JIT allow manufacturing companies to counter the vulnerability that they face due to the constantly shifting financial conditions. Thus JIT technique has played major roles and impacted drastically on firms that had to manage their economies. Organisations that have applied JIT have managed to obtain a competitive edge, enhance the quality of the products, and reduce waste.

III. CASE STUDY

The below case study is a real-time study of the impacts of the implementation of effective inventory management in one of the leading yarn manufacturing industries in India. The manufacturing company, hereinafter referred to as the ‘Manufacturer’, is located in Aruppukottai, TamilNadu, and the name of the company is not disclosed due to the purpose of confidentiality, as the company is in the process of taking it to a public listed company.

Though the Manufacturer has their manufacturing establishments at various locations in India and abroad, this study has been made in one of their major manufacturing establishments in Aruppukottai, TamilNadu, hereinafter referred to as the ‘Mill’.

The performance of Mill's inventory management is assessed using the below parameters:

i. Inventory Turnover Ratio:

This is used to measure the inventory management efficiency of the business. In general, a higher value of

inventory turnover indicates better performance and a lower value indicates lower performance. A lower inventory turnover ratio may be an indication of overstocking, which may pose a risk of obsolescence and increased inventory holding costs.

$$\text{Inventory Turnover Ratio} = \text{Cost of Goods Sold} \div \text{Average Inventory}$$

ii. Inventory Conversion Period or Number of Days of Inventory:

This reports about the average time to convert the total inventory into revenue/income/ sales. The inventory conversion period is part of the cash conversion cycle. Lesser the time, better the performance.

$$\text{Inventory Conversion Period} = \text{Total Days in the Year} \div \text{Inventory Turnover Ratio}$$

3.1.Scenario

The type of spinning used in the Mill is Ring Spinning and the capacity of the Mill is 32 tons per day with 145000 number of spindles. The Mill has a huge and separate storage warehouse of 75,000 Sqft within the Mill premises, where the inventories of the raw materials as well as the finished goods, yarn - packed in boxes that contain 32 number of cones in each weighing about 64 kilograms per box.

As per the Annual Report of the Mill for the Financial Year 2017-18, it was observed that the Inventory Turnover Ratio was 7.69 and the Inventory Conversion Period or Number of Days of Inventory was 47 days.

3.2. Implementation of Effective Inventory Management

The management of the Mill had decided to implement alternate inventory management techniques to improve the efficiency of the Mill and to improve the financial returns. Accordingly, it was decided to implement the concept of Just In Time at both the ends of the manufacturing, which is at the beginning in the perspective of management of the raw materials and at the end in the perspective of management of the finished goods.

Accordingly, due research and analysis were made to identify the right levels of the inventories to be maintained, both the raw materials and the finished goods. For this, extensive and exhaustive research to analyse the risks involved in implementing the JIT technique. This involved, not limited to, evaluation of the ability of the suppliers of the raw materials and the customers. Also, analyses were made to identify the production requirements from the existing customers and prospective customers, and the market conditions to check if there would be any problem in getting the raw materials right on time.

Upon obtaining all the required output requirements for the next 12 months, the team had identified the minimum stock levels of the raw materials and the levels of buffer stock, as a contingency in case of any unforeseen events, and the finished goods to be maintained for the next 12 months. During this exercise, it was also found that the huge storage warehouse of 75,000 Sqft was neither utilised earlier nor be utilised in the future to its full capacity.

Based on the above and to improve the efficiency of the operation and performance of the Mill, the inventories of the raw materials were reduced to the optimum stock levels (minimum required stock plus the buffer stock) and the same was maintained throughout the next financial year. A lot of other actions, such as constantly reviewing the risks identified earlier, monitoring the market trends and the production requirements, were also had to be instigated to run the planned production with the optimum stock levels.

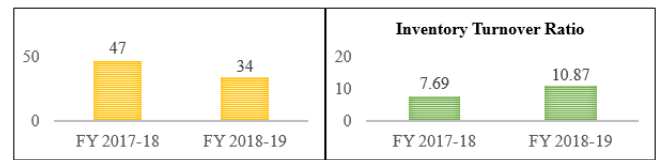
The Supply Chain Management team was advised to improve the relationships with the existing and potential suppliers of the raw materials. The Finance & Accounts team was advised to constantly monitor and clear off all the payments on time and before those falling due, as any delay in releasing the payments to the supply chain might affect the supply of the raw materials, which in turn might affect the manufacturing.

The Sales team was advised to revisit and offer a new and reduced selling price for the finished goods and to offer the customers with further reduced prices if they could shift the finished goods from the Mill within few days from its packaging. Further, the existing orders were also adjusted to reflect the revised prices to improve through the feedback of the customers and to win their further orders.

Although there were challenges initially, as there will be always during the learning curve, in implementing the effective inventory management system because of the reluctance of accepting the change by a majority of the employees of the Mill, they got accustomed to the change as they felt more comfortable and efficient with the new system.

3.3. Result

The new inventory management system was continued to be implemented throughout the financial year 2018-19. Based on the final Annual Report of the Mill for the financial year 2018-19, it is observed that the Inventory Turnover of the Mill during the same period has increased by 41%, from 7.69 to 10.87. Also, the Inventory Conversion Period or Number of Days of Inventory is reduced by 29%, from 47 days to 34 days.



3.4. Reflective Analysis

The implementation of the alternate and advanced inventory management technique has resulted in the better financial performance of the Mill in the Financial Year 2018-19. Also, it had resulted in the below-listed benefits.

- i. The size of the warehouse was reduced from its original size of 75,000 Sqft to 15,000 Sqft. As the warehouse was not fully utilised earlier and was just a non-performing non-current asset, the remaining area of the warehouse was converted as a commercial complex upon obtaining necessary authority approvals, which is currently leased/rented out to other parties for their commercial activities. Thus, the warehouse has now become a performing non-current asset generating additional income to the Manufacturer.
- ii. The market reputation of the Mill and the Manufacturer, at large, has increased due to the continuous interactions with the supply chain and customers, on-time payments to the supply chain, and reduced sale price to the customers.

iii. The operating costs for maintaining the warehouse and the spillage/wastage of raw materials due to long-time storage is eliminated due to the new system.

iv. As the cost of production is reduced due to the implementation of the new system, the Manufacturer could able to offer reduced prices to the customers, which in turn brought more orders and eventually more revenue in the Financial Year 2018-19, compared to the FY 2017-18.

IV. CONCLUSION

As seen above in the case study, proper management of the inventories will increase the efficiency of any business. Moreover, cutting down the resources, effort, and time spent on maintaining the unnecessarily high levels of the stock of raw materials as well as the finished goods will yield greater benefits in the overall operations of the business.

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