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Inventory Reduction by Applying Inventory Management Tools of a Selected Tannery Factory

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Abstract: Companies today must be fast and nimble enough to react quickly to changes in customer demand and do it with little inventory. Gone are the days when manufacturers could stockpile large quantities of raw materials; load-up the shop floor with work-in-process; and, pack warehouses with finished goods. The old ways cost too much, require too much working capital, and contribute to erratic and longer lead times. Inventory management includes a company's activities to acquire, dispose, and control of inventories that are necessary for the attainment of a company's objectives. The management of inventories concerns the flow to, within, and from the company and the balance between shortages and excesses in an uncertain environment. The evidence suggests that the stock market partially anticipates excess inventory situations, firms do not recover quickly from the negative effect of excess inventory, and the negative effect of excess inventory is economically and statistically significant. In this research, after implementing inventory management tools, 25% profit has been increased.

Key words: inventory management; inventory reduction; cost; profit; smooth operation
JEL code: L

1. Introduction

Inventory may be desirable, even necessary, for smooth operation and good customer service in many situations. For instance, inventory can be used to reduce the lead time to respond to customer demand, to smooth out the production rate when there is variation in demand, and to protect the company from underestimates of demand (forecast errors) or shortage of supply. Reasons such as these, plus the fact that inventory is considered as an asset on a company's balance sheet, have led many companies to carry excessive amount of inventory (J. B. Dilworth, 1993). Inventories may represent a significant portion of total assets; a reduction of inventories can result in a significant increase in return on investment (ROI), a ratio of profit after taxes to total assets. So, excess amount of inventories to be reduce for improving productivity and profit of company.

2. Review on Inventory Management

Inventory constitutes one of the most important elements of any system dealing with the supply, manufacture and distribution of goods and services. The concept of inventory control is very old but it came in light when Harris F. W. published his work on classical order size model. This work was extended by Raymond F. E. and

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Wilson R. M.. But, only after the second world war with the development of operational research and computer technology that the theoretical concepts got a practical application. The basic purpose of inventory holding stocks in a material flow system is to decouple successive stages of system (K. K. Ahuja, 1993). This chapter represents a detailed literature on inventory management systems obtained from different reference books, journals and thesis paper.

"Inventory Management Explained: A focus on Forecasting, Lot Sizing, Safety Stock, and Ordering Systems" by Dave Piasecki focuses on the key planning aspects of inventory management. Forecasting, Lot Sizing, Safety Stock, and Ordering Systems are explained in great detail.

A paper was carried out on the title of "Inventory Reduction" written by George Miller, Founder of PROACTIO. This paper addresses how to manage inventory investment to optimum levels, which means a reduction or major redistribution of it in most companies. Optimal inventory levels come down as management makes the operation more efficient by improving processes, reducing lead-time, managing supply and demand better. This paper has been modified & updated by Paul Deis.

Another paper was carried out on the title of "Inventory Reduction: getting results… and fast" written by R. Michael Donovan. He is the president of R. Michael Donovan & Co. This paper is devoted to a discussion about the Inventory Quality Ratio (IQR) methodology, which is supported by a software product. His another paper is on the title of "Inventory Reduction: Getting Lean, Mean and Effective". This paper also represent Inventory management by focusing on reengineer order-to-delivery, improve supply chain management, improve production scheduling, use effective performance metrics, utilize "pull" based on demand, reduce cycle times, develop flexible manufacturing & don't always blame inventory control.

Another paper was carried out on the title of "Inventory Reduction" written by Bourton Group. This paper addresses: What is inventory? Where is it? How much does inventory cost? Why inventory is created? How do we reduce inventory. Another paper was carried out on the title of "Don't Slash Inventory, Make It More Efficient" written by Larry Lapide. This paper addresses how to manage inventory by focusing on forecasting processes, inventory replenishment processes, Advanced Planning and Scheduling (APS), Co-manage supplier inventories).

Marvin B. Lieberman & Lieven Demeester prepared a paper on the title of "Inventory Reduction and Productivity Growth: Evidence from the Japanese Automotive Sector". The findings of this study help to elucidate the relationship between WIP inventory and productivity. They have tested alternative chains of causality and derived quantitative estimates of effects. The results are complementary with the large body of case study evidence on the implementation of JIT manufacturing. There analysis implies that productivity gains were stimulated by inventory reductions, rather than low inventory levels. Moreover, inventory reductions were followed by productivity gains, rather than vice versa. In quantitative terms, each 10% reduction in inventory led to an average gain of about 1% in labor productivity, with a lag of about one year. There were some significant differences among company groups: Toyota affiliates had a shorter lag; while Nissan affiliates demonstrated no significant productivity effect. Firms that made substantial inventory reductions enjoyed a period of productivity growth 1.5% to 2% higher than that of other companies, on average.

"Excess Inventory and Long-Term Stock Price Performance" by Vinod R. Singhal, His paper estimates the long-run stock price effects of excess inventory using nearly 900 excess inventory announcements made by publicly traded firms during 1990-2002. It examines the stock price effects starting one year before through two years after the excess inventory announcement date. Statistically significant abnormal returns are observed during the year before the announcement and on announcement. There is no evidence of statistically significant abnormal

return during the two years after the announcement. He estimated that the mean (median) abnormal return due to excess inventory during the year before the announcement and on announcement is -37.22% (-27.03%). Negative abnormal returns are observed across industries, calendar time, firm size, and actions taken to deal with excess inventory. The evidence suggests that the stock market partially anticipates excess inventory situations, firms do not recover quickly from the negative effect of excess inventory, and the negative effect of excess inventory is economically and statistically significant (www.stern.nyu.edu).

"Joint economic lot size problem with pipeline inventory cost" by Viput Ongsakul B. E., a thesis is in industrial engineering. In this thesis, he has studied the buyer-vendor area of the supply chain management problem. He mainly focused on the joint economic lot size for the buyer and vendor model.

Paper title is "5 Myths of Inventory Reduction" by Phillip Slater who is an Inventory Process Optimization Specialist and is widely known as "The Inventory Guy". He is the author of "Smart Inventory Solution" and "The optimization Trap". He focuses on Economic quantities, Risk must be re-evaluated, Consignment stocks, Software will solve the problem & Putting item into inventory shares the cost to reduce Excess inventory.

Krishan Rana and Ephrem Eyob are the writers of "Incorporation of Learning Curves in Economic Order Quantity (EOQ) and Economic Production Quantity (EPQ)". In this paper they illustrate the effect of learning on the basic EOQ and EPQ models. This model can be used for realistic inventory problems, because the setup cost is reduced in practice as the cumulative number of setups increases. The incorporation of the learning effect reduces both the lot size and inventory cost. Due to learning effect, the inventory carrying and setup costs are not equal for an optimal lot size unlike the classical models.

3. Methodology of the Research

Step 1: Conducting the primary survey

At first step of case study research a primary survey was conducted at Apex tannery limited, Dhaka, Bangladesh for the purpose of having a clear conception about the thesis work area as well as a preparation if the primary questionnaire.

Step 2: Observe the whole leather manufacturing process

In this step we observe the whole leather manufacturing process in Apex tannery limited, Dhaka, Bangladesh for knowing the work-in process and find out the inventory level and where the maximum inventory was take place.

Step 3: Preparing primary questionnaire

The primary questionnaire was formulated on the theoretical aspects of the study as well as on the basis of the primary survey. The study areas covered the inventory management system in the industry, the problem related to the order size, safety stock, lead time calculation and so on. It also included the cost associated with the inventory waste that must be considered for preparing an effective inventory management system.

Step 4: Modification of the questionnaire

Ahead of finalizing the primary questionnaire, necessary modifications were carried out considering the specific subject area through addition, deleting as well as reformation. After that the final questionnaire was prepared and sorted in different groups.

Step 5: Performing the case study and conducting interview

The case study conducted was mainly based on final questionnaire as well as basis of our specific subject

areas. The diagnostic interview was conducted with in person contact to gather necessary data and information. The survey interview was conducted with the decision and policy makers of different sections (Raw material, Operations etc.) to collect the related information.

Step 6: Data processing & analysis

In this step, the data that already have been gathered either by interviewing or by observation has been processed which are given in appendix. After completion of data processing, the analysis were made with help of graph, pie chart etc.

4. Data Collection & Analysis

Analyses on the findings of the case study conducted in the selected company have been presented in this chapter. Following the traditional theory of safety stock & work in process inventory a personal has been made for the reduction of safety stock level & work in process inventory for the concerned company. In addition the analysis also presents the impact of reduced safety stock level & work in process inventory on the overall working capital. In this research, Table 1 and Figure 1 has shown the raw material purchase whereas Figure 2 described the material usage. After the implementing the idea of inventory management, it has shown that yearly sales has been increased from 2004 to 2008 gradually in Table 2. Total labor cost has been reduced to 24420 taka and yearly profit has been maximized 2909153 taka.

Table 1 Raw Materials Purchase (Cowhides) in SFT

Raw Materials Purchase (Cowhides) in sft					
Year	Opening stock	Purchase this year	Closing stock (Raw Material Inventory)	Raw materials (Opening+ Purchase)	Raw materials use (Raw Materials-Closing Stock)
2004	178,622	17,952,146	184,305	18,130,768	17,946,463
2005	184,305	18,024,512	254,618	18,208,817	17,954,199
2006	254,618	17,953,458	158,292	18,208,076	18,049,784
2007	158,292	17,976,958	353,479	18,135,250	17,781,771
2008	353,479	17,921,801	243,453	18,275,280	18,031,827

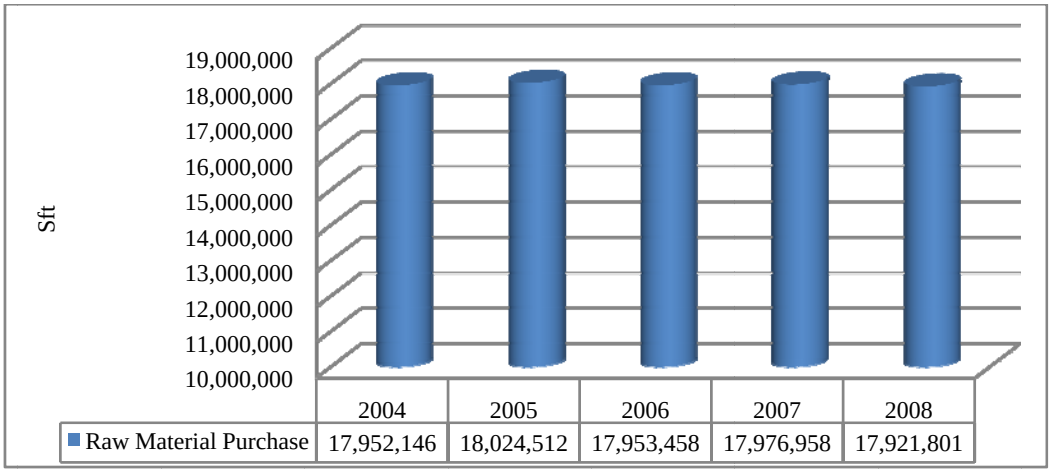

Figure 1 Raw Material Purchase

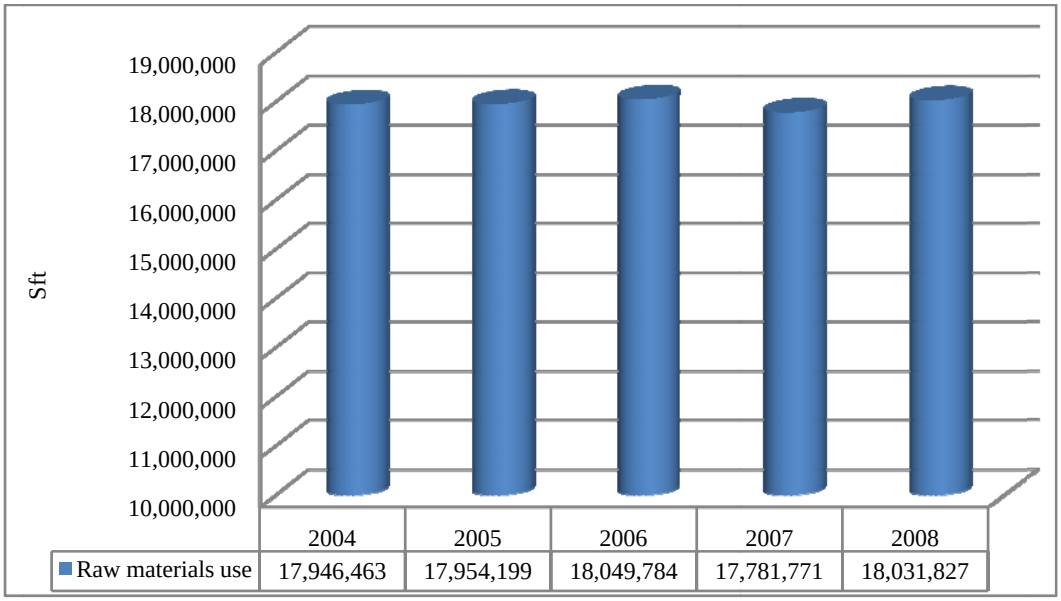

Figure 2 Raw Material Use

Table 2 Yearly Sales

Year	2004	2005	2006	2007	2008
Sales in sft	17628529	16236582	17748286	17055460	16489570

Table 3 Cowhide Sales in 2008

Year 2008	Sales in sft	Year 2008	Sales in sft
January	1565421	July	1340776
February	1612490	August	1293406
March	1459352	September	1360278
April	1240548	October	1261005
May	1270659	November	1325480
June	1374132	December	1386023

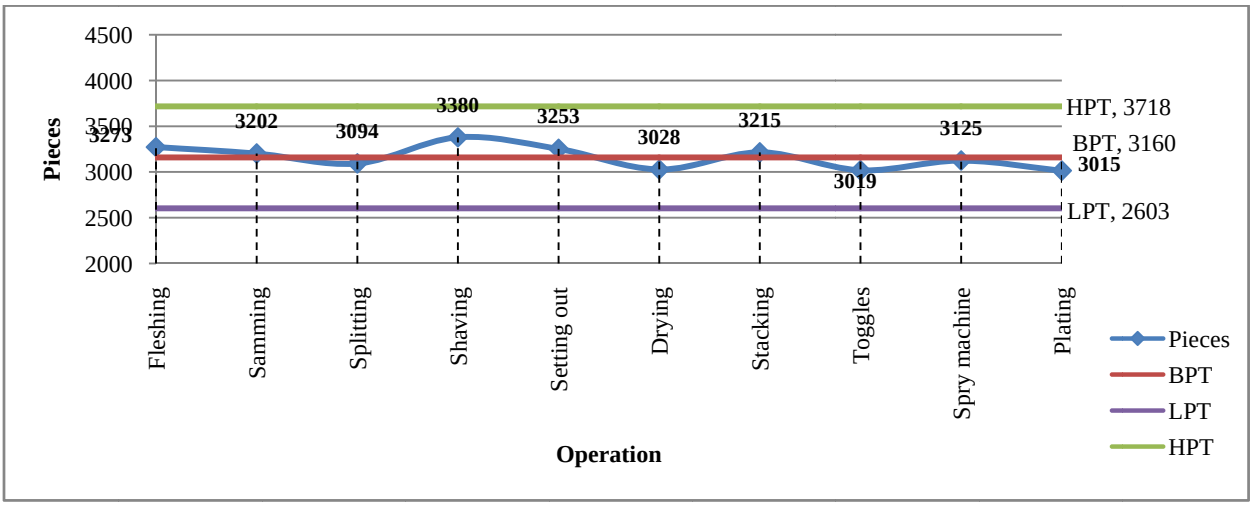

Figure 3 Process Control Chat (for Working Process Inventory)

Table 4 A Yearly Inventory Status

	Input (pieces)	Output (pieces)	Inventory/day (pieces)	Allowance for smooth operation	After allowance inventory/day (pieces)	Inventory / month (pieces)	Inventory per year in pieces (working days = 330 days)
Recent Organizational stage	4091	3015	1076	10%	968	29052	319572
After analysis	3273	3015	258	10%	232	6966	76626

Therefore,

Inventory reduction = (319572 - 76626) pieces

= 242946 pieces

This amount of excess stock will be held at supplier premises for a maximum additional period of 12 months.

Holding cost at Apex tannery limited at the rate of 15%

= (242946 * 175 * 15%) Taka

= (6377332.5) Taka

Holding cost at supplier at the rate 5% * Excess duty

= 242946 * 175 * 5% * 1.62

= (3443759.55) Taka

Savings = (6377332.5 - 3443759.55) Taka

= 2933572.95 Taka

But we have used excess 2 (Two) worker for 1 (one) hour per day.

Each labour cost per month = 6000 Taka

Each labour cost per hour for overtime = 37 Taka

So excess labour cost = (37*2*330) Taka *(1 Year = 330 working days)*

= 24420 Taka

So profit = (2933572.95 – 24420) Taka

= 2909152.95 Taka

5. Conclusion

Due to lack of available resources specially the relevant data and information, the case study has not reached the specific level which was expected. If the necessary data were available in the greater range it would be possible to find out the proper reflection of the objective that the study holds.

Finally the case study has revealed that the traditional inventory management system needs some modification depending on the situation or the operating environment, while inventory is management by company. The different inventory models provide a different set of capabilities and opportunities to exploit different competitive priorities. Some member of different industries and consulting firms have already started to criticize classical inventory models seem fashionable. But prior to the operating conditions different classical inventory models can be considered as the decision making tools that will enable a company to take its step under conflicting pressure. All the system needs is proper integration of operating and business. This will smooth the flow of information and implementation of such models would be fruitful.

6. Recommendation

At the analysis shows that the company can reduce the level of safety stock & work in process inventory, at first phase of recommendation represents how it can be carried out and the later phase defines the steps which should be proper monitored and controlled with a view to maintain an optimized inventory management system. This will enable to obtain an effective safety stock level & work in process inventory.

7. Scope of Future Work

The analysis shows the level of safety stock & work in process inventory that the company should maintain in order to ensure the tradeoff between the pressure of low inventory and that of high inventory. In the overall supply chain there are some factors which are very important to ensure the proposed level of safety stock and hence a balanced inventory system. Therefore the work can be carried out aiming to integrate the operation and business and it must focus on the following factors: Cutting the lead time to reduce the demand uncertainty during lead time. Supplier reliability can be increased by sharing the production plans with them, permitting them to make more realistic forecast. Improving the logistics capability by planning the infrastructure to meet demand, then implementing and controlling the physical flow of material and final goods from points of origin to points of use.

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