

THE EFFICIENCY DEVELOPMENT OF INVENTORY MANAGEMENT OF A CONSTRUCTION MATERIAL STORE IN PATHUM THANI

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ABSTRACT

Abstract— Improving the efficiency of inventory management of a Construction Material Store in Pathum Thani was to study the inventory management process and propose to improve the inventory management process to be more efficient. This study had explored and collected data related to the inventory management process. It found that because the shop did not plan to order products, caused the stock to be stocked with large quantities affecting the storage cost. Therefore, ABC analysis theory and Economic Order Quantity (EOQ) were used to improve efficiency of inventory management process and increase the ability to control inventory levels to meet the needs of customers.

The result showed that there were 721 product lists were divided into 3 types of inventory groups: A, B, and C. There were 126 items of A group, 243 of B group, and 352 items of C group. In addition, new orders are systematically planned, and cost savings were greatly improved by reducing inventory cost of A Group by 75% per quarter, B Group by 55% per quarter, and total cost by 62% per quarter.

Keywords— Inventory Management, Economic Order Quantity

INTRODUCTION

Inventory or inventories is necessary for almost all types of businesses. Because it is classified as one of the current assets that a business must have in order to keep production or sales running smoothly. However, the business has high inventory it will face the problem of high storage costs and deteriorated product. It also loses the opportunity to use the money in this inventory for other purposes. If the business has too little inventory It may face the problem of shortage of products (stock out) and lose the opportunity to sell products to customers. It's an opening for competitors and may eventually lose customers.

One of the building material stores in Pathum Thani province is a medium-sized construction material trading business distributor of construction materials and hardware, small materials common base material and hand tools. one of the construction material stores in Pathum Thani Province open for service from 7:30 a.m. – 5:00 p.m., one of the construction material stores in Pathum Thani province. It has various types of construction materials, including structural types, roofs, floor materials, ceilings, sanitary ware, bathrooms. and tools, etc. The study found that the store still lacks systematic inventory management. As a result, there is a problem in handling the product. The quantity of inventory exceeds the customer's demand which causes the problem of high storage costs and deteriorated product. In addition, it also causes the loss of the opportunity to use the money sunk in this inventory to use in other ways. Therefore, from the problems mentioned above, the researcher is interested in studying the inventory management of the store: One of the construction material products in Pathum Thani province and study ways to improve inventory management within the warehouse effectively.

Objectives of the research

1. To study the inventory management process of a construction material store in Pathum Thani Province.
2. To find ways to improve the inventory management process within the warehouse of One of the construction material stores in Pathum Thani province to be effective by using the theory of ABC Analysis and the theory of economic order quantity (Economic Order Quantity: EOQ).

Scope of research

This research will study sales forecasting, reduce the problem of wasted products of a construction material store in Pathum Thani Province. It will find the forecast value of the material demand of the appropriate customers and can reduce the cost of production to meet the needs of customers' ice orders.

LITERATURE REVIEW

1. ABC Analysis

The ABC inventory control technique is based on the principle that a small portion of the items may typically represent the bulk of total material usage of the total inventory in the construction process, while a relatively large number of items may from a small part of the money value of stores. The total material usage is ascertained by multiplying the quantity of material of each item by its unit price. The items. "A" Category – 5% to 10% of the items represents 70% to 75% of the total material usage. "B" Category – 15% to 20% of the items represent 15% to 20% of the total material usage. "C" Category – The remaining number of the items represents 5% to 10% of the total material usage. The relative position of these items shows that items in category A should be under the maximum control, items of category B may not be given that much attention and item C may be under a loose control.

Steps For The Classification Of Items: 1. Find out the unit cost and the usage of each material over a given period; 2. Multiply the unit cost by the estimated annual usage to obtain the net value; 3. List out all the items and arrange them in the descending value (Annual Value); 4. Accumulate value and add up number of items and calculate percentage on total inventory in value and in number; 5. Draw a curve of percentage items and percentage value; 6. Mark off from the curve the rational limits of A, B and C categories.

2. EOQ analysis: The EOQ refers to the order size that will result in the lowest total of ordering and carrying costs for an item of inventory. If a firm place unnecessary orders it will incur unneeded order costs. If a firm places too few orders, it must maintain large stocks of goods and will have excessive carrying cost.

3. Fishbone Diagram

A fishbone diagram is a visualization tool for categorizing the potential causes of a problem. This tool is used in order to identify a problem's root causes. Typically used for root cause analysis, a fishbone diagram combines the practice of brainstorming with a type of mind map template. It should be efficient as a test case technique to determine cause and effect.

A fishbone diagram is useful in product development and troubleshooting processes, typically used to focus a conversation around a problem. After the group has brainstormed all the possible causes for a problem, the facilitator helps the group to rate the potential causes according to their level of importance and diagram a hierarchy. The name comes from the diagram's design, which looks much like a skeleton of a fish. Fishbone diagrams are typically worked right to left, with each large "bone" of the fish branching out to include smaller bones, each containing more detail. Dr. Kaoru Ishikawa, a Japanese quality control expert, is credited with inventing the fishbone diagram to help employees avoid solutions that merely address the symptoms of a much larger problem. Fishbone diagrams are considered one of seven basic quality tools and are used in the "analyze" phase of Six Sigma's DMAIC (define, measure, analyze, improve, control) approach to problem-solving (Lewis, 2022).

4. Research

The process of control and management of inventory is a very important factor in the success or failure of any business. Poor or inadequate inventory management can present a serious challenge to the productive capacity of a manufacturing organization. The major objective of this study was to determine of the effectiveness of inventory management in a manufacturing company. This Study was based on both Analytical and Descriptive types. ABC analysis was proportional parts value analysis or demand and supply method or Pareto analysis. The study concluded the materials are classified according to ABC to reduce storage cost. It also helps to rationalize the number of orders and reduce the overall inventory (S.Kavitha, 2021).

This study aimed to understand the inventory management of Giant Superstore Taman Connaught. The study was qualitative study that explored the ABC analysis efficiency of inventory management in Giant Superstore, Taman Connaught an outlet of GCH Retail (Malaysia) SDN. BHD. ABC analysis was one method to manage the inventory management who good position was arranged according to the category such as A category product was high in value but low in quantity and C category product was low in value and high in quantity. The elements that were selected as significance included the product consumption rate, carrying cost and replenishment product lead time which contributed toward ABC analysis of inventory management efficiency in Giant Superstore. The study indicated dissimilarities in controlling the inventory in Giant superstore. The study found Giant had used POM.net in their inventory management since this software from ABC tool. HR manager needs to recruit quality skilled workers that have proper qualifications and acceptable for particular job duties (Jayakumaran, Shan, & Daud, 2019).

METHODOLOGY

1. Study the current condition of a construction material store in Pathum Thani Province.

From a study on the current working conditions of a construction material store in Pathum Thani Province, the researcher used the information obtained from the general study and the inventory management process in the warehouse to analyze the problems. There is no information system or technology to help record the product list,

employees forget to report the amount of product disbursement or report the amount of product disbursement and not real time management. Moreover, there is a large quantity of backlog products, defective goods and uncategorized storage.

2. Analysis of factors and causes of problems by using a fishbone diagram.

From the problems encountered above, the researcher therefore chose to study the problem of having a large quantity of backlog products and analyze the causes and factors that cause this problem by using a fishbone diagram. This can find ways to improve the process of inventory management in the warehouse of a construction materials store in Pathum Thani Province to be more efficient.

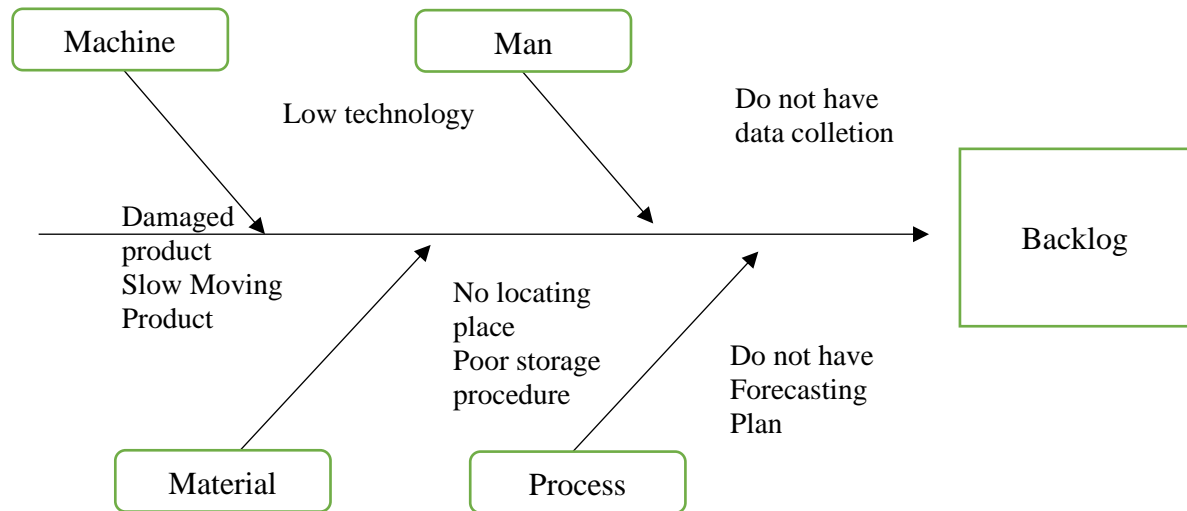


Figure 1 Fishbone Diagram Analysis

From the analysis of the problem of a large number of backlogs of a construction material store in Pathum Thani province by Fishbone Diagram, it was found that the cause of the problem was caused by the operational process factors. The store does not have a plan to order products, resulting in a large amount of backlog.

3. Problem Solving Guidelines

From the analysis of the problem of large quantities of unstocked products, the cause of the problem in the store has studied the concept of solving this problem, in order to be able to solve problems on the spot prevent problems from occurring and improves the efficiency of inventory management as follows:

1. Classification of goods by ABC Analysis theory

From the number of inventory items, the data has been studied from a construction material store in Pathum Thani province from January 2019 - March 2019. The researcher knows about the product information that there are 721 items in total, including the inventory turnover rate such as receiving goods disbursement of goods and the number of inventories. The researcher then used ABC Analysis method for grouping inventory, which had the following steps:

1.1 Find the amount of inventory demand for each item in the past 3 months.

1.2 Find the unit price of each inventory item.

1.3 Calculate the value of inventory by multiplying the demand for each product in the past 3 months by the unit price of that product. Based on inventory grouping using ABC Analysis, all 721 items were grouped by priority in inventory, with fast-moving items classified as A-type inventory with volume (5-15% of the total inventory), B-type is medium quantity (30% of total inventory) and the slow-moving product group is a large volume of C-type inventory. (50-60% of total inventory).

2. Economic Order Quantity (EOQ) analysis

In analyzing the economical order quantity (EOQ) as a way to solve the problem of excessive inventory, that is, a construction material store in Pathum Thani Province. There is an order of goods coming in to stock more than the demand or the customer's needs. Because the store must have products that will be fulfilled as customers want. Therefore, it is necessary to stock all types of products. And in each category there are multiple SKUs which makes the warehouse overstocked affect the cost of storage.

Economic order size (EOQ) and total cost of inventory management (TC) can be found by the following formulas:

$$\text{Estimated Economical Orders (EOQ)} = 2CoDCc$$

$$TC \text{ min} = CoDQ + QCc$$

Where EOQ = Economical Order Size (Q*)

D = Purchase cost per year (units)

Co = Cost per order (Baht)

Cc = cost of storage per unit per year (baht)

Q = Order quantity per time (units)

TC = lowest total cost (baht)

Annual Order Cost = DQCo

Annual Retention Cost = Q2Cc

Number of orders per year = DQ*

Order cycle time = Q*D

RESEARCH RESULTS

1. Product classification using ABC Analysis theory

After dividing the inventory of a construction material store in Pathum Thani province by using the inventory grouping method. ABC Analysis classifies products by priority of all 721 inventory items, with fast-moving items grouping as type A inventory with volume (5-15% of Total inventory) found that there were 126 items, followed by medium-moving items, which are type B inventory, medium volume (30% of total inventory), with 243 items, and slow-moving items, being type B inventory. The large volume C (50-60% of total inventory) was 352 items. Group A is very important and requires special attention, group B is moderately important and group C is high-volume but low importance.

2. Economic Order Quantity: EOQ

Table 1 compares the cost of group A inventory

A Group	Before EOQ	After EOQ	Comparing (BAHT)
Storage expenses (Baht/3 months)	3424.19	1858.87	1565.32
Total purchase cost (Baht/3 months)	803.88	929.43	-125.55
Total expenses (Baht/3 months)	4228.07	2788.3	1439.77

From the calculation of the economical order quantity (EOQ), it is possible to know the quantity that must be ordered to be properly reserved in the warehouse of sample products from Group A and Group B. It also causes costs. Decreased total inventory.

Total expenses per quarter of the sample inventory group A before analyzing the economical order quantity showed that total cost per quarter was equal to 4,228.07 baht. After analyzing the quantity of orders, it found that it were saved resulting in total expenses per quarter decreased by 1,439.77 baht, resulting in total expenses per quarter to be 2,788.3 baht or 65.50%.

Table 2 compares the cost of group B inventory

B Group	Before EOQ	After EOQ	Comparing (BAHT)
Storage expenses (Baht/3 months)	750.68	341.12	409.56
Total purchase cost (Baht/3 months)	312.62	168.77	143.85
Total expenses (Baht/3 months)	1063.3	509.89	553.41

The total cost per quarter of the inventory sample Group B before the economical order quantity analysis. The total cost per quarter was 1,063.3 baht after analyzing the quantity of orders that were saved, resulting in the total cost per quarter decreased by 553.41 baht, resulting in the total cost per quarter to 509.89 baht, representing 47.95%.

CONCLUSION

From the analysis of the economic order quantity (EOQ) of the samples of inventory from Group A and Group B, when compared before analyzing the economical order quantity. The total cost per quarter of inventory samples from group A and group B was 5,291.37 baht after analyzing the quantity of order savings resulting in the total cost per quarter. Of the inventory samples from Group A and Group B decreased by 1,993.18 baht, total expenses per quarter to 3,298.19 baht, representing 62.33%.

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