INCREASING EFFICIENCY IN WAREHOUSE MANAGEMENT BY USING ABC ANALYSIS OF OUTLET MALL COMPANY LIMITED, UDON THANI BRANCH

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Abstract

This research aims to manage the warehouse of the ADIDAS store in Outlet Mall Co., Ltd., Udon Thani branch, which focuses on inventory management to find a method of storing products, arranging products, and reducing the time spent searching for products in the warehouse. The ABC Analysis theory categorizes products, prioritizes, and types products according to their movement. The research found that before using the ABC Analysis theory to help in the operation, there were problems such as no separation of product types, the product not being arranged in a disorderly manner, and the employees being slow in searching for products. Therefore, the tools used to solve these problems, the fishbone diagram and the ABC Analysis theory, were used to help find the cause of the problem and solve the problem. It was found that the time spent searching for products could be reduced from the original. The total time spent searching for products by employees was 31.26 minutes, down to only 16.83 minutes, a 46.16 percent reduction.

Keywords: ABC Analysis, Efficiency, Warehouse Management

Introduction

Inventory management is a key factor affecting the operational efficiency of retail businesses, especially for products with a wide variety and large quantity like the ADIDAS brand of Outlet Mall Co., Ltd., Udon Thani branch, which must manage many types of products such as Accessories, Running, Training, and Original. The current challenges are the unorganized storage of products, lack of product classification, and limited storage space, which lead to problems such as delays in product search, incorrect product picking, and operational errors.

The impact of these problems not only creates difficulties for salespeople and companies but also reduces customer satisfaction, which is a key factor in business success. Therefore, effective inventory management is very important, not only to reduce operating costs but also to increase agility in customer service.

Applying analytical techniques such as fishbone diagrams to identify the root causes of problems and develop systematic solutions using ABC Analysis will help to manage products

within the stock more quickly, accurately, and with accuracy. climb This will have a positive impact on both the company's operations and the customer experience. The Objectives of this Research 1) To increase the efficiency of inventory management of ADIDAS brand products of Outlet Mall Co., Ltd., Udon Thani branch. 2) To reduce the time spent searching for ADIDAS brand products of Outlet Mall Co., Ltd., Udon Thani branch.

Research Objectives

1. To increase the efficiency of inventory management of ADIDAS brand products of Outlet Mall Co., Ltd., Udon Thani branch
2. To reduce the time spent searching for ADIDAS brand products of Outlet Mall Co., Ltd., Udon Thani branch

Scope of the Research

1. Population Scope

The population used in this research is the inventory of Outlet Mall Co., Ltd., Udon Thani branch. The sample of this research is measured by randomly picking products 15 times from employees.

2. Variable Scope

This research used fish bone diagram to analyze the cause of the problem and used ABC Analysis to classify and prioritize. Then compare the search times for products before and after categorizing and prioritizing them.

Literature Review

Fishbone Diagram

Fishbone Diagram is a cause-and-effect tool that helps you find the root causes of defects and failures in your processes.

A fishbone diagram is one of the root cause analysis tools. It is a structured process that helps identify the underlying factors or causes of undesired events. Understanding the factors that contribute to the system failure can help develop actions that support the solution.

A fishbone diagram, as the name suggests, is a diagram that mimics the skeleton of a fish. The underlying problem is placed in the head of the fish (facing right) and the causes extend to the left, just like the skeleton. Each fishbone represents a major cause, while the sub-bones represent the causes of each major cause. The structure of a fishbone diagram can be branched out to as many levels as necessary to find the root cause of the problem. (Jorportoday, 2024)

Mostly, the 4M 1E principle is used as a group of factors to lead to the separation of various causes. The 4M 1E comes from

M Man Workers or employees or personnel
M Machine Machinery or equipment
M Material Raw materials or spare parts other equipment used in the process
M Method Working process
E Environment Air, place, light and working atmosphere

ABC analysis

In materials management, ABC analysis is an inventory categorisation technique which divides inventory into three categories: 'A' items, with very tight control and accurate records, 'B' items, less tightly controlled and with moderate records, and 'C' items, with the simplest controls possible and minimal records. An ABC analysis provides a mechanism for identifying

items that will have a significant impact on overall inventory cost, while also providing a mechanism for identifying different categories of stock that will require different management and controls.

The ABC analysis suggests that inventories of an organization are not of equal value. Thus, the inventory is grouped into three categories (A, B, and C) in order of their estimated importance. 'A' items are very important for an organization. Because of the high value of these items, frequent value analysis is required. In addition to that, an organization needs to choose an appropriate order pattern (e.g. "just-in-time") to avoid excess capacity. 'B' items are important, but less so than 'A' items, although more important than 'C' items. Therefore, 'B' items are intergroup items. 'C' items are marginally important. (ABC analysis, 2024)

Research Methodology

1. Research Methodology
   This research is qualitative research
2. Research Steps
   This research is using a fishbone diagram to analyze the problems and causes of the problems using the 4m 1E principle as a group of factors leading to the separation of various causes and using the ABC Analysis theory to the prioritization of groups and types of products.
3. Data Collection
   Data collection will be done by having each employee find a product randomly assigned by the researcher. It will be one model of shoe, but the size will be different, namely shoe code HQ6353, size 8-12 US, for a total of 5 pairs. Time will be set from finding the model and location of the product from the POS system until the employee walks to pick up the product in the stock and walks back to the cashier counter. Data will be collected with 3 employees in the store for the same product model 5 times.
4. Data Analysis
   This research is using a fishbone diagram and using the ABC Analysis. Then Let the staff test the product search in the specified product type by timing the search and recording the time before and after the improvement and display the comparative data of the product search time before and after the improvement.

Research Results

Using a fishbone diagram to analyze the problems and causes of the problems using the 4m1E principle as a group of factors leading to the separation of various causes The results are as shown in the table and figure below.

Table 1: table of 4M 1E factors

	Problem	Solutions
Man	-Staff are not proficient in using POS programs to find the location of products. -Staff lack enthusiasm in finding products.	Provide training on the use of POS programs and sales techniques and services for both old and new employees to increase expertise in using the program and stimulate enthusiasm in providing services to customers.
Material	- There are many types of products.	The products are in large quantities and have many types. The staff must categorize the products and arrange them according to the

	Problem	Solutions
	- Storage system with both RACK and FLOOR makes the space narrow.	ABC Analysis method, with the fast-moving products at the front.
Machine	The pos software is quite old.	Let employees train and learn how to use the program, use shortcuts to reduce the time spent searching for products through the POS system.
Method	- The products in the POS system do not match the actual products.	All processes, whether it is receiving products, returning products, or products with defects such as selling the wrong model, wrong color, wrong size, must be trained for employees so that they know the correct method and can solve the problems that occur.
Environment	Limited storage space	Increase storage space using the 5S principles

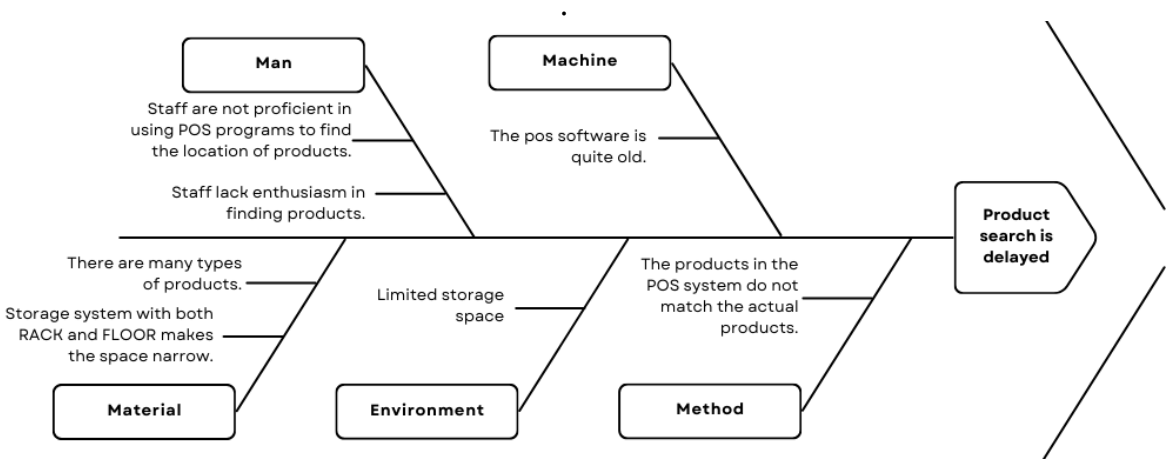

Figure 1: analyze the problems and causes by using a fishbone diagram

Using a fishbone diagram, the problems and solutions were summarized. Data was then collected by timing the time spent searching for products and picking products for the specified product models by all three employees. The time data was then compared to the data before and after the improvements.

It was found that the main problem was caused by the employees first because the employees did not manage the products in the stock in an orderly manner, did not arrange the products in categories, did not separate them by groups and types of products, from receiving the products from the shipping company.

The next problem was the employees in the store who still lacked enthusiasm, care, and knowledge in using the POS program, which is used to search for products in the stock. This software can identify the location of products arranged in the stock on the product storage rack. Although the use has many steps, if used skillfully, it will be possible to search for products quickly and accurately.

Table 2: Product search data collection table (before improvement)

Product search data collection table (before improvement)

Employee	Number of Times	Product/Size	time (min.) POS	Picking	Total
A	1	HQ6353/8	0.42	1.27	1.69
	2	HQ6353/9	0.39	1.3	1.69
	3	HQ6353/10	0.4	1.35	1.75
	4	HQ6353/11	0.4	1.3	1.7
	5	HQ6353/12	0.38	1.29	1.67
Total			**1.99**	**6.51**	**8.5**
B	1	HQ6353/8	0.53	1.3	1.83
	2	HQ6353/9	0.49	1.33	1.82
	3	HQ6353/10	0.5	1.31	1.81
	4	HQ6353/11	0.52	1.29	1.81
	5	HQ6353/12	0.49	1.3	1.79
Total			2.53	6.53	9.06
C	1	HQ6353/8	1.1	2.1	3.2
	2	HQ6353/9	1.05	2.05	3.1
	3	HQ6353/10	1.05	2.1	3.15
	4	HQ6353/11	0.55	1.55	2.1
	5	HQ6353/12	0.58	1.57	2.15
Total			4.33	9.37	13.7

After Using ABC Analysis, the products are categorized and organized, they can be clearly identified by arranging product groups according to product movement, such as the best-selling shoe product group is arranged at the front of the warehouse, the second-best-selling accessory product group is arranged in the middle zone of the warehouse, and the clothing product group, which sells relatively slowly, is arranged in the back zone of the warehouse, as shown in the image below.

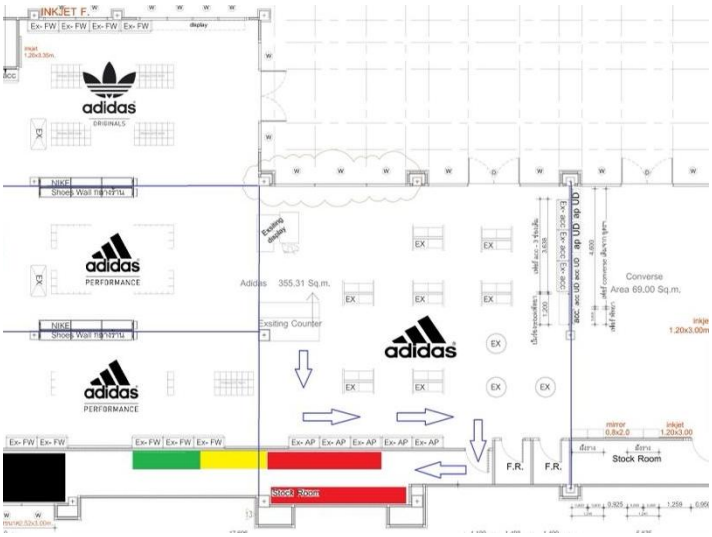

Figure 2: The warehouse layout after using ABC Analysis

The red color is the group of products that move quickly and are cheap, which are the sportwear running, training accessories, and performance running shoes groups. The yellow color is the sportwear original group and the original sport style shoe group that are mid-range in price and move steadily. The green color is the group of products that move slowly or do not move at all. Most of them are groups of products that are quite high priced, both in the original group and the performance running shoe group, and products with incomplete sizes, with only a few sizes remaining. Finally, the black color is the group of products waiting to be returned, including products that are defective, damaged, and waiting to be transferred to be sold at other branches of the company.

Table 3: Product search data collection table (After improvement)

Product search data collection table (After improvement)

Employee	Number of Times	Product/Size	time (min.)		
			POS	Picking	Total
A	1	HQ6353/8	0.39	0.55	0.94
	2	HQ6353/9	0.35	0.5	0.85
	3	HQ6353/10	0.38	0.52	0.9
	4	HQ6353/11	0.4	0.52	0.92
	5	HQ6353/12	0.38	0.5	0.88
Total			**1.9**	**2.59**	**4.49**
B	1	HQ6353/8	0.41	0.56	0.97
	2	HQ6353/9	0.4	0.55	0.95
	3	HQ6353/10	0.38	0.59	0.97
	4	HQ6353/11	0.39	0.57	0.96
	5	HQ6353/12	0.42	0.52	0.94
Total			**2**	**2.79**	**4.79**
C	1	HQ6353/8	0.59	0.59	1.18
	2	HQ6353/9	0.58	0.58	1.16
	3	HQ6353/10	1	1.02	2.02
	4	HQ6353/11	0.57	1.06	1.63
	5	HQ6353/12	0.55	1.01	1.56
Total			**3.29**	**4.26**	**7.55**

Collecting data after improvement by ABC Analysis method can reduce the time to search for products as follows: Employee A spent a total of 4.49 minutes, Employee B spent a total of 4.79 minutes, and Employee C spent a total of 8.08 minutes.

The total time reduction after each improvement was as follows: Employee A's total time reduction was 4.01 minutes, Employee B's total time reduction was 4.27 minutes, and Employee C's total time reduction was 6.15 minutes. The total time spent searching for products by employees was 31.26 minutes, down to only 16.83 minutes, a 46.16 percent reduction.

Discussion

The problem of delayed product search is caused the employees first because the employees did not manage the stock, did not arrange the products in categories, did not separate them by groups and types of products, from receiving the products from the shipping company

and employees lacked enthusiasm, care, and knowledge in using the POS program. This is consistent with the study of the ABC Analysis for Operational Improvement and Warehouse Management, which investigated two main problems: the long and long distance and time of product withdrawal, which affect the efficiency of the warehouse management system. (Chaichumpol,S. & Kanchana, K., 2020)

After using ABC Analysis, the time to find products can be reduced, which is consistent with the study of the optimization of warehouse order picking using the ABC Analysis: A case study of ABC Co., Ltd., which found that in the dimension of time to pick products according to the purchase order, the processing time after the improvement is reduced because the product grouping makes the inventory be managed into categories and arranged according to the importance of the products. (Tommanee, S. & Kanokporn, K., 2022) And consistent with improvement of storage facilities in dry goods warehouse: case study vermicelli production company by ABC analysis is applied to group goods from its movement. In addition, Solver, the Microsoft Excel add-in program combined with the principle of linear programming along with the theory of the rapid movement goods. The goods have been also installed near by the door so as to assist allocate the position of the goods. From the result, it indicated that the storage system can effectively improve with installing model 1 and the industrial shelves. By the increase in storage capacity of 328 pallets, or 59.85% and the overall average storage distance decreases 12,810.86 meters or 63.85% (Boonpakdee,W., Suppajindakorn, W., Tsai, V., & Keawsasaen, S., 2020)

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