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The Reduction of Inventory and Warehouse Costs for Thai Traditional Wholesale Businesses of Consumer Products

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Abstract

This paper deals with the problems of inventory and warehouse costs for Thai traditional wholesale businesses in consumer products. The wholesale businesses of consumer products consist of a few hundred of suppliers and almost fifty thousand Stock Keeping Units (SKUs), which inventory and warehousing are not only costly but also hard to manage. This study’s main objectives are to know the source of the high inventory and warehousing costs, and to find ways on reducing them. The study involves shop owners as respondents and uses observational study and interview for data gathering. This research also applies the concept of basic mathematical model for integrating all segments by applying Excel program in single window of purchasing, inventory, sales and marketing segments, which is decision maker. The data were then interpreted with the help of statistical tools. This research reveals that most of Thai traditional wholesale businesses lack knowledge and methodology for executing business by separating management of procurement and purchasing, inventory and warehouse, and sales segments. The result also shows that Thai traditional purchasing is decided more by feeling rather than facts. The high inventory and warehousing costs have occurred by purchasing, so sales and marketing can help to reduce inventory and warehouse costs. Therefore, if the integration of all segments is a single window management, then it becomes the best way for executing business.

Keywords: Inventory and Warehouse Costs, Logistics Cost, Wholesale businesses, Consumer Products, Economic Order Quantity(EOQ), Period Order Quantity(POQ)

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1. Introduction

The important components of total logistics cost are transportation, warehousing, inventory carrying and logistics administration costs. Empirical studies, however, reveals that inventory carrying cost and warehousing costs have higher percentage cost to transportation. For instance, approximately 61% of the total logistics costs comprise of non-transportation related logistics cost [1, 2]. Suffice it to stress that the inventory carrying costs and warehousing costs are highly interdependent on the efficiency of the transportation system. Similarly, the increased use of information technology in logistics management can improve the efficiency of supply chains and, equally, had a balancing effect on the total logistics cost [3].

According to the latest report; Singapore, Japan, Korea and Indonesia’s cost of logistics in 2008 are 8%, 8.9%, 12.8% and 19% of their GDPs respectively. For Thailand, the value of total logistics costs in 2008 was equivalent to 18.6 per cent of the country’s GDP (1.7 trillion Baht) [4]. Three cost components are identified: transportation cost ~8.0%, inventory holding and warehouse cost ~10% and logistics administration cost ~0.6%. Clearly, the inventory and warehousing have the highest costs in the three components. A 1% decrease of inventory and warehouse cost would help increase several billions of baht. Therefore, cost reduction in logistics affects directly Thailand’s competitiveness. While goods are delivered to middlemen or wholesalers, occurring cost during the business transactions affects directly to price offered to retail shops. Nowadays, several foreign companies conducting wholesale businesses have lower cost in total than that of domestic wholesalers due to owning massive capital and advanced management technologies. If the domestic companies do not improve logistics efficiency, competitiveness will decline. Finally they have to go out of business or must be taken over [5].

The article values improvement of inventory and warehouse systems in wholesale businesses, thus launching the inventory and warehouse improvement project for consumer product wholesalers. The article applies logistics knowledge to wholesaler, which help decrease inventory and warehouse cost. As a result, Thai goods would gain competitiveness. Meanwhile the decrease in logistics cost of sale and marketing contributes low price products to end user.

2. Theory and Literature Reviews

2.1 Theoretical

In general, for an organization, customer services and cost reduction is the main key to gain competitive advantage. To reform its services to fit customer desire, the organization has to improve its service level and decrease its costs regularly. Consequently, logistics development program within the organization is necessary. Logistics cost takes place from the activity of keeping and moving inventory. Therefore cost reduction is a search for measure to make the activity conducted in maximum efficiency manner which conceptually composed of two principles that are the activity must bring about expense as less as possible and the inventory must be kept in lowest level. According to the principles for logistics cost reduction, following actions must be proceeded [6]

- Improve logistics activities to be efficient
- Explore no value activities in working processes
- Analyze the difference of logistics cost of each suppliers and customers
- Categorize supplier and customer types by actual logistics cost
- Determine person in charge of logistics cost from the result of the logistics cost analysis
- Identify responsible criteria of each work groups for logistics cost
- Assign the cost reduction mission to the person in charge of the activity causing the expense

Apart from the previous act, the critical element of warehouse management is the design and layout which influences on efficiency of the retail business significantly. Therefore, the desirable warehouse should have a good layout planning of which objectives are as follows:
- Increase storage capacity
- Improve material flows
- Decrease carrying cost
- Decrease loss/damaged goods from storing
- Improve customer service level
- Improve working conditions/environment

Besides Randomized Storage and Dedicated Storage, two types of stock keeping classification, Compatibility, Complementariness and Popularity could be the criteria for keeping the goods in a warehouse. The efficiency of the arrangement is dependent on inventory turnover rate, available space, and shipping routes. For example, the highest turnover rated goods should be placed the nearest to exits. The principal arrangement technique applies to warehouse management of the studied business, putting suppliers in order of average sales turnover rate from the fastest to the slowest and lining up goods of each supplier in order of sales turnover rate from the fastest to the slowest once more.

In addition to the wholesaler inventory management, the favorable structure of its autonomous system has to utilize ERP, Enterprise Requirement Planning, and simulated situation system of which design is fit to policy and work procedure of the organization and should prepare parameters for network with a large number of retail stores.

2.1.1 Forecasting Models [7]

Moving Average: The moving average is moving because we look each time at the last N values. All these values have the same importance.

Exponential Smoothing: All the past data give decreasing weights. The curves correspond to the forecasts obtained using the exponential smoothing method with a factor $\alpha$.

Linear Regression: The regression analysis aims at fitting a straight line in the set of points. Since there are different ways of fitting the curve, an objective must be selected.

Double Exponential Smoothing: By using an exponential smoothing, decreasing weights will be given to the data. The goal here is also to determine the model parameters $\alpha$ and $\beta$.

Winters’ Method: The method here consists in a triple exponential smoothing by which all the model parameters are updated when a new observation is obtained.

CMA Method: Two different methods will be described. The first method is CMA stands for centered moving average. The second method is called triple exponential smoothing or method of Winters.

Seasonal times series: The CMA values can thus be seen as rough estimates of the real demand without seasonal variation.

2.1.2 Inventory Models

The economic order-quantity (EOQ) model considers the trade-off between ordering cost and storage cost in choosing the quantity to use in replenishing item inventories. A larger order-quantity reduces ordering frequency, and, hence ordering cost/month, but requires holding a larger average inventory, which increases storage (holding) cost/month. On the other hand, a smaller order-quantity reduces average inventory but requires more frequent ordering and higher ordering cost/month. The cost- minimizing order-quantity is called the Economic Order Quantity (EOQ). This builds intuition about the robustness of EOQ, which makes the model useful for management decision-making even if its inputs (parameters) are only known to be within a range of possible values. This also provides intuition about choosing an inventory-management system, not just an EOQ [8].
Period Order Quantity (POQ) is the model with the best overall performance [9], which the fixed number of periods is determined as the economic time between orders and/or fixed number of periods as lot sizes.

2.1.3 Warehouse Management

Generally, too many warehouses are now trying to do two and three times what they were designed for. They have inventory sitting in the aisles. They have multiple SKU’s on the same pallet. And unfortunately, it creates a whole lot of other problems, which are indicators of the need to re-design the warehouse. The overall approach to a good warehouse design is heavily impacted by the collection of data, the understanding of business issues, and the development of design concepts [10].

2.2 Literature Reviews

There are many researches for studying surveying and gathering processes of logistics management in wholesale businesses and linkages among manufacturers, wholesalers and retailers. The wholesale businesses have applied the logistics management theory comprising wholesale store management, organization, human resource and logistics development planning for raising efficiency. The selected pilot company for the southern part of the Northeast of Thailand, Taweekit Department Store (Burirum Province), showed that the result of the development program records a decrease in stock value of about 50.73 million baht within 6 months [11]. From the Middle part of Thailand, Samorn Piboon (Samutsongkarm Province) Store, showed a result of the development program records a decrease in stock value of about 8.20 million baht within 6 months [12]. From the South of Thailand, Kaichoung K.C. (Ranong Province) Store, showed a result of the development program records a decrease in stock value of about 18.11 million baht within 6 months [13].

There is a research about a new mathematical model of logistics systems for solving the inventory cost in the wholesale businesses. The research is a study and a survey of logistics management for wholesale and retail businesses with six locations in four regional areas of Thailand. The objective of this research is an application of simple mathematical model to solve logistics management for wholesale and retail businesses. The results of the analysis found that respondents manage their inventories through “feeling” for their businesses. Also, the forecasting of the value of sales volume errors resulting in a backup product to sell is in high inaccuracy. This is an important issue that needs to be improved by using a mathematical model of the application of logistics management. We use warehouse management to be a data center management for purchases and sale management. The result of the development of logistics management finds that the stock value of the inventory reduces to 72 million baht approximately [14].

There was a previous work concerning research of forecasting model for wholesale businesses with a case study conducted at Seri Lumpang Department Store. Using sales data of all 82 suppliers from January 2010 to December 2010, it determined the appropriate forecasting model by using the Mean Absolute Percentage Error (MAPE) with the lowest cost. In the test, the forecasting found 35 suppliers could be appropriated with the moving average, 27 suppliers were in line with the season series Winters, 13 suppliers could be appropriated with exponential smoothing, and 7 suppliers could be appropriated with double exponential smoothing respectively [15].

3. Inventory and Warehouse Model

The algorithm is based on previous work [14] for implementation to Thai wholesale businesses. We obviously re-write the operation procedure as Figure 1. This is applied to manage inventory and warehouse to all wholesale businesses. We first simultaneously collect history data for forecasting model and warehouse management. The data history of sales value collected for preparing forecasting model is at least 1 year range. The researchers assumed that the forecasting model to be used was the 3 months moving average because there are a few tens of...
thousands SKU’s, which is not easy to start for implementation. The researchers used the Pareto Rule 80:20 [16] of total history purchasing of suppliers within 1 year to begin with. And then each supplier has requested to isolate the forecasting model in each product list. The warehouse management is applied by re-laying with the concept of storage separating supplier. The reasons of re-laying the warehouse are, first, to count inventory on hand and, second, to reduce inventory damaged cost.

The inventory model is called with minimum stock and maximum stock in period ordered [17]. The inventory carrying is considered to level stock (Low, Medium, and High). It is obvious that if the inventory carrying is less than safety stock then there is a back log. If the inventory carrying is greater than safety stock then there is an over-inventory. If the inventory carrying is equal to safety stock, there is else medium inventory (as shown in Figure 1). Moreover, it can be known how long the over-inventory holds on without purchasing. These can be made possible by using Microsoft Excel. The formulations of calculation are shown below.

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\begin{align*}
\text{Minimum Stock} &= \text{Daily Demand Forecasting} \times \text{Lead Time} \\
\text{Maximum Stock} &= \text{Daily Demand Forecasting} \times (\text{Lead Time} + \text{Period Ordered}) \\
\text{Inventory Carrying} &= \text{Minimum Stock} - \text{Inventory on Hand} \\
\text{Days of Inventory Hold on without Purchasing} &= \frac{\text{Inventory Carrying}}{\text{Daily Demand Forecasting}} \\
\text{Economic Order-Quantity (EOQ)} &= \frac{\text{Demand Forecasting} + \text{Inventory on Hand} + \text{Safety Stock}}{\text{Inventory Carrying}}
\end{align*}
\]

This model can be analyzed by inspection at level of the inventory carrying value. If the high level, then manager has to immediately stop the purchasing and then consult with supplier and/or use 4 P’s strategy of marketing to reduce stock. In the order hand, if the low level, then manager has to consider for ordering (EOQ).

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Fig. 1 Operations Procedure of Inventory and Warehouse Management for Wholesale businesses
4. Results

This research implements the inventory and warehouse model with 10 Thai wholesale businesses. They are located in four regions of Thailand. They have different sale volumes, sale areas, warehouse areas, technology supports, and human resources. We have surveyed around 30 wholesale businesses before deciding to choose 10 wholesale businesses based on their readiness and intention. The results in showed in Table 1 shows that inventory and warehouse models can reduce the total inventory and warehouse cost to approximately 136.8 million baht.

| Wholesale | Inventory & Warehouse Cost (Million Baht) | Credit Note (Million Baht) |
|-----------|------------------------------------------|---------------------------|
|           | Pre  | Post | %Diff. | Pre  | Post | %Diff. |
| 1)        | 100  | 95   | 5.0%   | 0.005| 0.001| 80.0% |
| 2)        | 60   | 50   | 16.7%  | 0.3  | 0.2  | 33.3% |
| 3)        | 120  | 95   | 20.8%  | 2.5  | 2.0  | 92.0% |
| 4)        | 30   | 26   | 13.3%  | 0.07 | 0.02 | 71.4% |
| 5)        | 100  | 78   | 22.0%  | 1.5  | 1.0  | 35.3% |
| 6)        | 20   | 17   | 15.0%  | 0.08 | 0.04 | 50.0% |
| 7)        | 150  | 120  | 20.0%  | 0.1  | 0.04 | 60.0% |
| 8)        | 70   | 65   | 7.1%   | 1.0  | 0.6  | 40.0% |
| 9)        | 35   | 29   | 17.1%  | 0.5  | 0.1  | 80.0% |
| 10)       | 170  | 150  | 11.8%  | 8.0  | 5.0  | 37.5% |
| Total     | 885  | 725  | 18.1%  | 14.05| 7.21 | 48.98%|

Total Reduced Stock = 13

Total Reduced Credit Note = 6.8

5. Conclusion

This research deals with the problems of high inventory and warehouse costs for the case study of 10 Thai traditional wholesale businesses of consumer products that bear high cost. The wholesale businesses of consumer products consist of a few hundred suppliers and almost fifty thousand of SKUs (Stock Keeping Units), which are hard to manage in terms of inventory and warehousing. Thai traditional purchasing has been decided more through feeling than facts. Clearly, general purchasing theory can be considered facts, such as Economic Order Quantity (EOQ); however, it is not applied directly for executing because it only required intangible data and purchasing execution also required the period order quantity (POQ) with suppliers. We have created the inventory and warehouse model by using forecasting model, re-layout warehouse, new inventory model, and marketing strategy to reduce cost in wholesale businesses. Therefore, the integration of all segments is a single window management in Excel, and then it is considered the best way for executing business. In the case study of 10 Thai traditional wholesale businesses, the inventory and warehouse models can reduce the total inventory and warehouse cost to approximately 136.8 million baht.

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