

Extent of Application of Various Inventory Control Techniques Among Supermarkets in Nairobi

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Abstract

Inventory management is important to firms with inventory comprising of ten to forty five percent of the total assets. Large inventories consume cash, increase investment in business and can bankrupt a business if not properly controlled. Therefore, there is need to apply proper inventory control techniques at the supermarkets. This study sought to determine the extent of the application of the various inventory control techniques among the supermarkets in Nairobi. Survey research design was employed. The target population comprised of all supermarkets based in Nairobi, as listed in the Yellow pages of the Nation Business Directory (NBD), Nairobi 2010). A sample size of 50 supermarkets was utilized. Stratified random sampling was used with strata based on only two categories that existed that is supermarkets with one branch and those with more than one branch was used. Data was collected through a questionnaire. The questionnaire was administered to 50 supermarkets in Nairobi. The respondents generally pointed out a number of challenges regarding the application of the respective inventory control techniques. EPOS registered the highest number of challenges mainly because it was also the most widely used. The main challenge of applying the EPOS technique was that it was expensive to install and maintain. FIFO was also quoted as not applicable to all types of inventory and not accurate in predicting reorder levels. Similar sentiments were also raised in respect of the minimum stock level technique, batch control, periodic review and just-in-time inventory control techniques. EOQ was quoted as not easy to learn and that it was expensive to install and maintain.

Key Words: Inventory, Inventory Control

I.INTRODUCTION

Inventory control is the supervision of supply, storage and accessibility of items in order to ensure an adequate supply without excessive oversupply (Mattson, 2007). It is an accounting procedure or system designed to promote efficiency or assure the implementation of a policy or safeguard assets or avoid fraud and error. The main benefits of inventory control according to Brooking et al (1995) include the reduction of inventory cost and provision of detailed reports for inventory management as well as flexibility to suit individual needs of customers thus promoting customer loyalty. Additionally, it strengthens the relationship with suppliers through an on-going partnership which leads to profitability improvement for the supplier and demonstrating that product price is only part of the cost of doing business with a supplier.

Chopra et al (2001), in their study on supply chain management, highlighted that the main shortcoming of inventory control is the over reliance on a preferred technique so that this brings about rigidity in application. The study states that most firms will apply a certain technique even when it is not the best as a matter of policy. Successful inventory management involves balancing the costs of inventory with the benefits of inventory (Taylor, 1997). Business owners must therefore appreciate fully the true costs of carrying inventory, which include not only direct costs of storage, insurance and taxes, but also the cost of money tied up in inventory. The fine line between keeping too much inventory and not enough is not the manager's only concern. Other concerns include maintaining a wide assortment of stock but not spreading the rapidly moving ones too thin, increasing inventory turnover without sacrificing the service level, and keeping stock low but not sacrificing service or performance. Additionally, managers are concerned with obtaining lower prices by making

volume purchases but not ending up with slow-moving inventory and having an adequate inventory on hand but not getting caught with obsolete items.

In Kenya supermarkets grew from a tiny niche at the start of the 1990s to 20% of the urban food retail sector by 2005. While the supermarket as a concept is not new to Kenya the first supermarkets arose in the 1960s, their rapid growth is a very recent phenomenon, having taken off since the mid-1990s. Self-service stores in general and supermarkets in particular have popped-up all over the country with the count standing at around 220 supermarkets by 2005. The key findings of the study was; supermarkets are growing at rate of 18% per year, supermarkets in Kenya have grown from a niche in the mid-1990s to 20% of the urban food market and supermarkets have spread from the capital to intermediate and small towns, with 44% of supermarket sales and 58% of supermarket stores located outside of Nairobi by 2003. (Neven and Readon, 2005).

II. RESEARCH OBJECTIVE

To determine the extent of the application of the various inventory control techniques among the supermarkets in Nairobi.

III. RESEARCH QUESTION

To what extent are various inventory control techniques applied among the supermarkets in Nairobi?

IV. LITERATURE REVIEW

According to William and Tokar (2008), the basic (Q, r) inventory control model introduced by Harris allows a firm to place orders of size Q whenever its inventory position reaches a re-order point (r). The logistics literature has extended the (Q, r) approach in several respects. For example, authors have considered additional factors, such as transportation factors, buyer/seller relationships, quality considerations, short lead times and emergency conditions, among others.

According to Alstrom (2001), the economic order quantity model (EOQ) was developed to find the optimal order quantity. The study found that 84 percent of the firms surveyed used the EOQ model for inventory control. Annual holding cost increases with an increase in lot size, but in contrast, the annual order cost decreases with an increase in lot size. Material cost is independent of lot size because it is assumed to have a fixed price. The concept of the EOQ is that there is a tradeoff between the fixed order cost and the holding cost.

The EOQ assumes the four following inputs: annual demand of the product, fixed cost incurred per order, cost per unit, and holding cost per year as a fraction of product cost. Using those inputs, there are three costs that must be considered when deciding on lot size. The first is annual material cost which is annual cost of material purchased. Annual order cost is the cost for the lot ordered. The last is the annual holding cost which is the annual cost of holding inventory. Lot or batch size is the quantity that a stage of the supply chain either produces or purchases at a given time.

Chopra and Meindl (2001) state that the appropriate level of safety inventory is determined by two factors which are uncertainty of demand or supply and the desired level of product availability. As the uncertainty of demand or supply increases, the level of safety inventory also increases. If the desired level of product availability increases, the safety inventory must

also increase. Thus, these two factors must be understood and minimized to lower the overall amount of safety inventory carried.

Minimizing the amount of safety inventory is a matter of minimizing the total of two different costs, the first one being the cost of holding safety stocks, and the second is the cost of being out of stock. The two costs have an inverse relationship: as one decreases, it increases the other. The risk of being out of stock depends on the chance of consumption in a delivery period being unusually large.

Maia and Qassim (1999) came to the conclusion that the optimal strategy for safety inventories is to eliminate stock-outs or not to hold safety stocks at all. The study showed opportunity costs as stock-out costs. They stated that intermediate inventory levels are uneconomical. Also noted is that the products that should be stocked are those in which the opportunity costs are higher than inventory costs.

The firms' operating risk associated with inventory policy can be decomposed into two components according to Kim and Chung (1989). The first is pure output market risk which is risk inherent in the demand uncertainty. The second is risk resulting from the need to determine the order quantity before the actual demand is revealed. They concluded that the optimal inventory level of the risk adjusted value-maximizing firm is lower than that of the expected profit-maximizing one, and the higher a firms output market uncertainty, the lower its optimal inventory level, where output market uncertainty is defined as the relative volatility of the demand for the firm's output.

Yassin et al (1997), suggests that there are three general classes of costs that are important to determining inventory policy. They are procurement costs, carrying costs, and stock-out costs. Procurement costs are those associated with the acquisition of goods for the replenishment of inventories. Carrying costs result from storing or holding goods for a period of time. Carrying costs may be space costs, capital costs, inventory service costs, and/or inventory risk costs. Stock-out costs are incurred when an order is placed but cannot be filled from the inventory to which the order is normally assigned.

McClelland (1960) notes that customer service is usually included in conventional inventory models by imposing a penalty cost on shortages when minimizing inventories. This creates implementation problems in the application of the model because you now have penalty costs that have been distorted and are difficult to establish. Unlike a fixed asset, stocks held for normal trading or manufacturing purposes can usually be realized in a matter of months without appreciable loss so that only a small premium over the marginal cost of borrowing would be required.

V.RESEARCH METHODOLOGY

The study adopted a survey research design. The target population of this study was drawn from all supermarkets (102) based in Nairobi, as listed in the Yellow pages of the Nation Business Directory (NBD), Nairobi 2010). The study utilized a sample size of 50 supermarkets. A total of 50 questionnaires were delivered to the physical locations of the respondents and 36 questionnaires were found to be complete, which formed the basis of the data analysis in this study. In this context, the response rate for this study was 78% which was considered adequate for data analysis. Data was analyzed using Statistical Package for Social Sciences (SPSS). Correlation analysis was used to establish the level of correlation

between the techniques investigated, while factor analysis was used to ascertain the inventory control techniques that were most widely applied by supermarkets in Nairobi and subsequently determine the extent of the application of the various inventory control techniques among these supermarkets.

VI. RESEARCH FINDINGS AND DISCUSSIONS

Correlation Analysis

The study sought to establish the correlation between the various inventory control techniques. This analysis was useful because it sought to explain which techniques were positively correlated and hence could be applied together and which ones were not. The correlation matrix, Table 1, indicates that supermarkets that applied the just-in-time inventory technique to a large extent were also very likely to apply EOQ, minimum stock level, batch control and periodic review while those that used EPOS were most likely to apply EOQ and FIFO. On the other hand, firms that applied the basic (Q,r) model were unlikely to at the same time apply the EOQ, FIFO or the EPOS technique as these three techniques have a negative correlation with the basic (Q,r) inventory approach. This may be due to the fact that the basic (Q,r) approach is not inventory turnover period based and as a result its use automatically negates the other three.

Table 1; Correlation Matrix

Correlation	VAR 00002	VAR 00003	VAR 00004	VAR 00005	VAR 00006	VAR 00007	VAR 00008	VAR 00009
VAR 00002	1.000	.907	.776	.874	.844	-.048	.717	.788
VAR 00003	.907	1.000	.970	.997	.538	.254	.944	.455
VAR 00004	.776	.970	1.000	.985	.316	.408	.996	.223
VAR 00005	.874	.997	.985	1.000	.476	.302	.966	.389
VAR 00006	.844	.538	.316	.476	1.000	-.419	.231	.995
VAR 00007	-.048	.254	.408	.302	-.419	1.000	.457	-.447
VAR 00008	.717	.944	.996	.966	.231	.457	1.000	.136
VAR 00009	.788	.455	.223	.389	.995	-.447	.136	1.000

Variable	Description
VAR 00002	EOQ
VAR 00003	Just-in-time
VAR 00004	Minimum stock level
VAR 00005	Batch control
VAR 00006	FIFO
VAR 00007	Basic (Q,r) Model
VAR 00008	Periodic review
VAR 00009	EPOS

Factor analysis

Factor analysis was used to analyze the factors that are deemed to contribute most to popularity of inventory control techniques. The results arranged the factors according to the order of magnitude and significance in a descending order. Table 2 shows Factor 1 as EPOS which was found to be the most widely used inventory control technique applied by supermarkets followed by FIFO (factor 2), EOQ (factor 3), and minimum stock level (factor 4). Given that cumulative variance reaches 100% in the fourth factor, from the results of the

study, it can be concluded that the first four factors fully explain inventory control techniques applied by supermarkets in Nairobi. Consequently, the four factors and especially the first three are deemed to be the most widely applied inventory control techniques by supermarkets in Nairobi.

Table 2: Factor Analysis

Factor	Initial Eigen Values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.483	56.039	56.039	4.483	56.039	56.039	3.213	40.165	10.165
2	2.079	25.988	82.027	2.079	25.988	82.027	2.695	33.687	73.852
3	1.202	15.021	97.048	1.202	15.021	97.048	1.856	23.196	97.048
4	0.236	2.952	100.000						
5	1.597E-17	1.996E-15	100.000						
6	1.670E-17	2.088E-16	100.000						
7	2.691E-16	-3.363E-15	100.000						
8	8.993E-16	-1.124E-14	100.000						

Extraction Method: Principal Component Analysis

Factor	Description
1	EPOS
2	FIFO
3	EOQ
4	Minimum stock level
5	Just-in-time
6	Batch control
7	Basic (Q,r) Model
8	Periodic review

VII.CONCLUSION OF THE STUDY

The study concluded that supermarkets that apply just-in-time inventory technique to a large extent apply it together with EOQ, minimum stock level, batch control and periodic review while those that used EPOS apply it together with EOQ and FIFO. On the other hand, the study concluded that supermarkets are unlikely to apply the basic (Q,r) model and at the same time apply the EOQ, FIFO or the EPOS technique as these three techniques have a negative correlation with the basic (Q,r) inventory approach.

VIII.RECOMMENDATIONS OF THE STUDY

Though EPOS was quoted as the most popular inventory control technique, it appears to be expensive to install and maintain. The study therefore recommends that efforts should be made by the government to ensure that information technology is affordable.

Even though FIFO was quoted as the second most popular inventory control technique, it is worth noting that it is not applicable to all types of inventory especially non-perishable goods. Hence, the technique is recommended for the fast moving goods, those that waste away quickly and those subject to obsolescence only.

The EOQ technique was quoted as being the third most popular technique. The main challenge in its application was that it was not easy to learn. Efforts should therefore be made

by training institutions to teach the concept of EOQ and other related concepts in a simplified manner to enhance comprehension and appreciation of the technique.

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