International Journal of Business Marketing and Management (IJBMM)
Volume 6 Issue 6 June 2021, P.P. 08-13
ISSN: 2456-4559
www.ijbmm.com

Economic Order Quantity Stock Control Technique and Performance of Selected Level Five Hospitals: An Evidence of Kenya

Korir Kiprotich Geoffrey[1], Dr. Pauline Kaitany[2], Dr. Hellen Sang[3]
[1]*MBA, School of Business, University of Kabianga, Kenya,*
[2]*Department of Marketing Management Science, Tourism and Hospitality, University of Kabianga,* [3]*Department of Marketing Management Science, Tourism and Hospitality, University of Kabianga*

Abstract*: Health sector is considered as one of the most important sectors in any economy because the wellness of a country depends on the wellness of its citizens. This can be only achieved when there is an efficient and effective health system in the country. Despite many government interventions to ensure that services are not interrupted in public hospitals in Kenya, there are still many challenges as pertains to efficient stock management leading to frequent stock outs. The paper main focus was to establish the relationship between Economic Order Quantity stock control technique and performance of selected level five hospitals in south rift region, Kenya. Which used economic quality theory. A correlation study design was appropriate. A target population of 248 employees comprised of staff working under procurement and supply chain department who were handling material acquisition, stock control department, record department and disposal department in the selected level five hospital. Purposive sampling technique was used to select 156 respondents where questionnaires were used for data collection. Data was analyzed descriptively and presented using frequency tables. Inferential statistics was also analyzed using regression models. The study findings revealed that economic order quantity had a positive statistical relationship with performance of the level five hospitals of β =0.316, P<0.000. The study recommended that the hospital should always evaluate the time taken in replenishing stocks. The study findings may be beneficial to stakeholders for better policy formulation and scholars who will be interested in this area of study as they will use this study as a source of their secondary data.*

Keywords: *EOQ, Stock Control Techniques, Performance, Correlational Research Design, Kenya.*

I. Introduction

Stock control is a systematic approach which ensures that there is constant flow of materials in and out of an organization. This usually entails a process of controlling the movement of stocks with a purpose of ensuring that appropriate levels of stock are maintained in the organization at any particular time. This prevents stocks from running out or an organization over stocking materials which may lead to adverse effects such as locking of capital and insufficient materials for operations, (Dryden, Guise, Kato, Anderson, Aronson, Belinson and Mitchell, 2015). Stock control management on the other hand is a management process that ensures proper planning, organizing, directing and controlling the levels and amount of costs which are related to total value of goods that are held in an organization at any given time, (Agus and Noor,2010).

Stock control management is purposive. It is aimed at preventing or reducing wastages and losses, getting better value of return after disposing off supplies and lastly continuous utilization of supplies. For inventory management to attain the organization's objectives, the following should be adhered to; better inspections, thorough tests, stores and warehousing, and inventory techniques need to be reinforced as well as proper transfer and disposing of properties (Swaleh and Were, 2014). A study done in India by Kanagaraju and Baskaran (2012) revealed that the main purpose of stock management in line with public procurement policies was to maintain inventory at a minimum point considering the organizational needs at a given time in order to have the highest possible output on financial capital invested. This can be achieved by minimizing stock holding costs and stock run out costs. Ahmad, Norhasni, Zien and Yusoff, (2015) discovered that numerous problems emanating from inventories management under the guideline of public procurement policy framework possess threats to sustainability and performance of Malaysia health sector systems against a background of increasing

health expenditures. The study established that the health sector systems in Malaysia are majorly inefficient due to high resource wastages within the private and public sectors. The study findings revealed the need for thorough implementation of inventories management techniques to contain those issues. Stock for drugs and other medical equipment were poorly controlled leading to holding large stock which were not required immediately. These drugs have high chances of becoming obsolete and other materials expiring leading to inefficiencies and poor performance of the health sector

In the Kenyan context, stock management challenges are the same as those of other countries in Africa. Public and private institutions face and continue facing stock control challenges. The Kenyan government enacted the Kenya Procurement and Disposal Act (2005) with an aim of controlling the procurement, management and disposal of materials in public institutions (Godana & Ngugi, 2014). Public procurement in all government sectors including public health facilities follow the public procurement and disposal Act of 2005 and public procurement regulations of 2006. Various studies done locally on the influence of stock control techniques on organizational performance include that of Swaleh and Were (2014) who did an assessment to determine the factors influencing effective implementation of material control techniques in public institutions in Kenya. Findings from the study revealed that the main aim of public institutions in Kenya is to stock the correct quantity of materials and maintaining minimum inventory costs.

A study conducted by Mungu (2013) indicated that in health facilities, stock management is put in place with an aim of obtaining optimal inventory level of drugs and essential health equipment to foster or improve on service delivery that satisfies the patients which is not the case in other institutions. A study by Nyabwanga (2012), on the effect on stock control practices and performance of small business enterprises in Kenya established that firms are using stock management system as a tool to increase their financial performance and gaining competitive advantages. Majority of the companies in Kenya are using internal stock management techniques such as computerized material control systems, material audit and developing organizations stock control policies and procedures (Swaleh & Were, 2014).

The south rift region forms part of the large rift valley region in Kenya. It's comprised of Kericho, Bomet, Narok and part of Kajiado County. The health sector in this region has health facilities classified into national referral hospital (level 7), provincial (level 6) and district health facilities (level 5) and health centres (level 3 and below). The ministry of health has classified health facilities based on their primary characteristics such as the range of services they offer to the public and the facility's bed capacity. Other secondary characteristics used to categorize health facilities include the range and size of the hospital and the size of the hospitals' target population (MOH, 2012). There are three public level five hospitals in the region. These are Kericho, Longisa and Narok Level five hospital.

The health sector falls under the devolved functions as stipulated under chapter 11 of the constitution of Kenya as adopted in 2010. This sector is considered as one of the most important sectors in the country because the wellness of the economy depends on the wellness of its citizens which is ensured by efficient and effective health system. The government in achieving its vision 2030 and the big four agenda, has embarked on promoting the health care systems. Despite this measures and efforts in the health sector, public hospitals are still not in a position to offer adequate health services. According to the ministry of health reports, Poor management of inventories in health facilities has affected efficient management of health projects. This is because inventories in the health sector consume almost twenty percent of the gross domestic product as well as sixty percent of the budget. Several studies have been done to establish the relationship between stock control and organizational performance but majority of these studies have focused on the corporate sector while few studies have been done targeting the service industry more so the health sector. Therefore, there was need for further studies to examine the relationship between stock control techniques and performance of selected level five hospitals in south rift region, Kenya. To assess the relationship between Economic Order Quantity stock control technique and performance of selected level five hospitals in south rift region, Kenya.

II. Literature Review

Theoretical Review

Economic Order Quantity theory was postulated by Ford Wilson Harris in 1913. The theory was critically analyzed and elaborated by Bovis, (2016). This model has proved that some costs increase while some others decline. There is a clear evidence that ordering costs reduce with a reduction in stock holding and when holding cost goes up total stock which is related with cost curve reach a minimum level. At this point, material costs are minimized. Therefore, economic order quantity is a point where stock minimizes the total holding material costs and order cost. According to Allen (2008), economic order quantity theory minimizes the cost between stocks holding costs and costs of reorder. According to Erickson and Kovalainen (2008), there are assumptions used to calculate economic order quantity. These assumptions are that time cycle is known and constant; inventory holding cost are constant and; lead the price per unit is constant; ordering costs is known and

constant; the replenishment is made instantaneously, the rate of demand is known and constant; no stock-outs are allowed and the whole batch is delivered at once.

There is a limitation associated with economic order quantity. One of the limitations is that it does not take into consideration of buffer inventories which are meant to be used when there is variation in demand and lead time thus becoming hard to put into practice (Chalotra, 2013). This model takes all the items in the warehouse to be determine their point of order and also economical amount of quantity to be ordered (Chinchuluun, Karakitsiou and Mavrommati, 2016). There is an assumption by the model that other variables remain constant even if there are some regular uncertainties experienced by all the businesses. This uncertainty can include damage during transportation, changes in demand and delay in delivery. This uncertainty may require use of EOQ in order to buffer stock against uncertainty of business environment. The theory is relevant to this study simply because it ensures minimum inventory and maximum inventory levels are checked and evaluated because of effectiveness and efficiency in production.

III. Empirical Review

Economic order quantity refers to the optimum amount of stock that a company is required to purchase in order to minimize inventory costs such as storage costs, holding costs and ordering costs (Bachetti, Plebani, Saccani & Syntetos, 2010). Economic order quantity is considered as one of the oldest classical production scheduling models which was developed by Ford (1913). This model is considered ideal in managing stocks levels when the demand for materials is constant over a period of time. New inventory order is delivered in full once the stock levels have reached zero. For each order placed, it attracts a fixed cost regardless of the amount of goods ordered. Each unit ordered also attracts a unit cost for storage known as holding cost. This cost is most often indicated as a percentage of the total purchase cost of the item (Heravia & Pirayesh, 2019).

Economic Order Quantity helps the institution to have a plan on their stock reordering and ordering within the right time duration such as yearly, half year, quarterly, or on monthly basis. This leads to minimizing warehouse storage costs as stocks are bought and put into use almost immediately (Schonberger, 2008). It is therefore important for organizations to assess and determine their re-order point in order to minimize costs. Improper and inefficient management of inventories in organizations in the past has attracted a lot of attention from scholars' interest who want to establish the appropriate technique that can improve organization performance

A study by Kisaka (2006) on the impact in reducing cost of raw materials stock in dairy firms established that there was a cost saving element which had been brought by adoption of economic order quantity model. This study was carried out by comparing the total cost incurred in keeping stocks of raw materials through traditional project employed method and cost of stock management under economic order quantity method. The study targeted all the dairy firms in one locality and collected primary data through structured questionnaires. These implied that cost saving on storage and ordering of materials led to overall improvement of financial performance of the dairy firms.

A study on economic order quantity technique and its impact on Firms financial performance was conducted by Padachi (2006). The study used 58 small manufacturing firms in Mauritius from 1998 to 2003 where a case study research design was adopted for the study. Quantitative data was analyzed by use of SPSS and findings presented by correlation and regression models. The findings for the study indicated there was a relationship between material receivables and profits margin. The main indicators adopted for the study were stock replenishment period, cash conversion cycles, accounts payable and accounts receivable which were found to have a positive influence on financial performance of the manufacturing firms.

A study was carried out by Panigrahi (2013) to assess the relationship between stock management and profit in five top cement companies in India within a period 2001-2010. Controllable variables under study included size of the organization, current ratio and financial debt ratio. Gross operating profit was used to measure the dependent variable. The research findings revealed that material processing period had a negative relationship to profitability of the firms. It was further established that the firms' profit had insignificant relationship to financial debt ratio.

A study by Thogori and Gathenya (2014) on the role of inventory management on customer satisfaction among the manufacturing firms in Kenya established a positive relationship between inventory management technique and customer satisfaction. The study was a case study of Delmonte Company as the organization has a well elaborated supply chain material technology of sharing information which is closely connected to their clients in real time to boost its stock management. The study adopted census research design because the target population was small (50) and therefore all of them formed a sample size. Primary data collection technique was adopted where an observation guide, interview guide and Questionnaire were used. The findings from the study revealed that all the respondents agreed that there was minimum stock in the store. The study held that processing and

manufacturing firms experienced low stock management system and this affected firms from satisfying their clients thus leading to decrease in sales and profitability.

IV. Methodology

Correlational research design was utilized. Where selected public level five hospitals in south rift region of Kenya with total population 258 employees working in procurement department. Stratified random sampling technique was used, stratified into procurement departments which are procurement office, material acquisition office, stock control office, record management office and disposal management office to select a sample size of 156 respondents. Data was collected using structured questionnaire. Descriptive statistics were analyzed and presented by use of frequency tables. These statistics indicated the mean and standard deviation which was used to describe the nature of the relationship between stock management techniques and performance. Inferential statistics was presented using regression models.

V. Results And Discussion

The study sought the respondents' opinion on the use of Economic Order Quantity in management of stocks in the organization. EOQ is a model that is used in purchasing to reduce inventory costs such as storage, holding and ordering costs. This technique allows for ordering stocks based on the required amount only. The summary results were presented in table 1 below.

Table 1: Frequency Table and mean for Economic Order Quantity Stock Control Technique

Statement on Economic Order Quantity	SA 5	A 4	N 3	D 2	SD 1	Mean	SD
The hospital minimum stock levels to maintained in the hospital at all the time	40(25.6)	60(38.5)	20(12.8)	24(15.4)	12(7.7)	3.5897	1.2384
Ordering costs are evaluated periodically	40(25.6)	56(35.9)	8(5.1)	32(20.5)	20(12.8)	3.4103	1.3952
Holding costs is evaluated to determine the right amount of stock to be purchased	32(20.5)	52(33.3)	28(17.9)	24(15.4)	20(12.8)	3.3333	1.3116
The hospital is always aware of the time taken to replenish stocks	44(28.2)	32(20.5)	20(12.8)	36(23.1)	24(15.4)	3.2308	1.4628
Economic Order Quantity ensures smooth flow of goods in hospital	44(28.2)	36(23.1)	28(17.9)	12(7.7)	36(23.1)	3.2564	1.519
Use of EOQ ensures smooth flow of goods	64(41.0)	44(28.2)	12(7.7)	16(10.3)	20(12.8)	3.7436	1.4136

Key: ***SD- Strongly Disagree, D= Disagree, N-Neutral, A-Agree, SA-Strongly Agree, SD- Standard Deviation.***

From Table 1, the study established that 40(25.6) of the respondents strongly agreed that the hospital maintained minimum stock levels at all the time. 60(38.5) of the respondents agreed, 20(12.8) were neutral while 24(15.4) disagreed and 12(7.7) of the respondents strongly disagreed. This resulted to a mean score of 3.5897 on average, the hospitals maintained minimum stocks at all the time.

When asked whether ordering costs were evaluated periodically; 40(25.6) of the respondents strongly agreed that ordering costs were evaluated periodically. 56(35.9) agreed, 8(5.1) of the respondents were neutral while 32(20.5) disagreed and 20(12.8) of the respondents disagreed with a mean of 3.4103.

On whether holding costs were evaluated to determine the right amount of stock to be purchased, 32(20.5) of the respondents agreed, 52(33.3) agreed 28(17.9) were not sure while 24(15.4) disagreed and 20(12.8) strongly disagreed. Therefore, majority of the respondents agreed that the hospital often evaluated to determine the right amount of stock to be purchased with a mean score of 3.3333.

On examining whether the hospital was always aware of the time taken to replenish stocks, majority of the respondents agreed to that effect 44(28.2), 32(20.5) of the respondents also agreed that the hospital was always aware of the time taken to replenish stocks. 20(12.8) were not sure while 36(23.1) disagreed and 24(15.4) strongly disagreed. This translated to mean of 3.23084. Finally, when asked on if Economic Order Quantity ensured smooth flow of goods in hospital 44(28.2) strongly agreed, 36(23.1) agreed, 28(17.9) were not decided and 12(7.7) disagreed while 36(23.1) strongly disagreed. A mean of 3.2564 was attained.

Thogori and Gathenya (2014) concurred with the results that the respondents agreed that minimum stock were kept to assist in smooth running of the organization. However, the study further revealed that low stock management system affected the client satisfaction and led to decrease of sale as well as profitability. It is evident that despite holding minimum stock in the hospital there is need to restock early to avoid shortage of drugs and essential items in the hospital. On the contrary, Panigrahi (2013) found negative relationship between material processing period and profitability. However, the current study found the replenishing period to be significant in performance of the hospital. It is important to have replenishing period that ensure sufficient preparation for ordering until receiving hospital materials.

Economic order quantity was examined in relation to performance of level five hospital. The summary of coefficient was presented in table 2 below.

Table 2: Regression Coefficient

Model		Coefficients			t	Sig.	Collinearity Statistics	
		Unstandardized Coefficients		Standardized Coefficients				
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-0.200	0.194		-1.035	0.302		
	Economic Order Quantity	0.316	0.066	0.277	4.777	0.000	0.516	1.939

a. Dependent Variable: Performance of selected level five hospitals

Source: Research Data (2021)

The regression coefficient in table 2 indicated that economic order quantity had strong significant relationship with performance of selected level five hospitals ($P<0.05$). The model above indicates that if Economic Order Quantity increases by one unit, it results to 0.316-unit increase in performance of level five hospitals.

HO_1 There is no significant relationship between Economic order quantity stock control technique and performance of selected level five hospitals in south rift region, Kenya.

The study established a positive statistical relationship between Economic order quantity stock control technique and performance of selected level five hospitals hence the null hypotheses was rejected. Similar, results were observed by Padachi (2006) where EOQ was found to have significant relationship with financial performance of organization. These was based on the fact the EOQ managed stock replenishing to avoid stock out. Therefore, EOQ has significant influence on the performance of organization.

VI. Summary, Conclusion And Recommendations

Summary

The research findings revealed that the hospital maintained minimum stock at all the time. Ordering and holding costs were evaluated periodically to determine the value of stock that could be held at the facility. However, it was established that the hospital was not aware of the time taken to replenish stocks. The study established a

significant strong relationship (β =0.316, P<0.05) between economic order quantity stock control technique and performance.

Conclusion

From the summary of the findings, the study concluded that the hospitals used EOQ technique in the management of materials. Minimum stock levels were maintained at the hospitals. The study also concluded that the hospital had efficient stock level tracking systems which ensured that the management were aware of the level of stock at all the time.

Recommendations

From the findings, the study recommends that; the hospital should always be sure of the time taken in replenishing stocks. This ensures that stocks levels are well maintained at all the time. The hospital should also evaluate the ordering and holding costs periodically for better cost management.

References

[1]. Agus, A. &. (2006). Supply chain management and performance. An Empirical Study. A working paper university of Malaysia

[2]. Ahmad, F., Norhasni, M., Zien, R. & Yusoff, B. (2015). The Influence of Inventory Management Practices towards Inventory Management Performance in Malaysian Public Hospitals. International Academic Research Journal of Business and Technology 1(2), 142-148.

[3]. Allen, J. M. (2011). "Method and system for determining optimal or near optimal product quantities." U.S. Patent Application 12/657,871, filed June 16, 2011.

[4]. Chalotra, V. (2013). Inventory management and small firm's growth: An analytical study in supply chain. Vision, 17(3), 213-222.

[5]. Chinchuluun, A., Karakitsiou, A., & Mavrommati, A. (2008). Game theory models and their applications in inventory management and supply chain. In Pareto optimality, game theory and equilibria (pp. 833-865). Springer, New York, NY.

[6]. Dryden R., Guise, J. M., Kato, E., Anderson, J., Aronson, N., Belinson, S., ... & Mitchell, M. (2015). EPC methods: an exploration of methods and context for the production of rapid reviews.

[7]. Erickson, H., & Kovalainen, L. (2008). The triple -A supply chain. Harvard Business Review on Supply Chain Management,3, 87-115

[8]. Godana, B. E. & Ngugi, K. (2014). Determinants of Effective Inventory Management At Kenol Kobil Limited. European Journal of Business Management, 1(11), 341- 361.

[9]. Kanagaraju, P. & Baskaran, B. (2012). A Study on Inventory Management in Public Sector Sugar Mills in Tamilnadu. Primax International Journal of Commerce and Management Research, 1(1), 65-76.

[10]. Ministry of Healthy (2019). Report on National and County Budget Analysis, Retrieved from http://www.healthpolicyplus.com/ns/pubs/11306-11563_NationalandCountyBudgetAnalysis.pdf

[11]. Mungu (2013); Supply chain management practices and stock levels of essential drugs in public health facilities in Bungoma East Sub County, Unpublished MBA research project, University of Nairobi

[12]. Nyabwanga, R. N., & Ojera, P. (2012). Inventory management practices and business performance for small-scale enterprises in Kenya. KCA Journal of Business Management, 4(1), 11-28.

[13]. Swaleh, L. A. & Were, S. (2014). Factors Affecting Effective Implementation of Inventory Management Systems In The Public Sector (A Case Study Of National Aids Control Council). International Journal of Social Sciences Management and Entrepreneurship, 1(2), 17-32.