EFFECT OF INVENTORY MANAGEMENT PRACTICES ON SUPPLY CHAIN PERFORMANCE OF CEMENT MANUFACTURING FIRMS IN KENYA

Mercy Kirui
Student, Master of Science (Procurement and Logistics Management)
Jomo Kenyatta University of Agriculture and Technology

Denis Kamau
Lecturer, Jomo Kenyatta University of Agriculture and Technology

CITATION: Kirui, M. & Kamau, D. (2022) Effect of Inventory Management Practices on Supply Chain Performance of Cement Manufacturing Firms in Kenya. *International Journal of Human Resources and Procurement*. Vol. 11 (4) 1 – 16.

ABSTRACT

Organizations have implemented inventory management practices because of the advantages gained from it and they considered a valuable asset to an organization as it helps in reducing operational costs, maximizes revenues gained and increases sales. At times organizations fail in managing its inventories which lead to reduced productivity, increase in production costs and resource wastages. The purpose of this study was to investigate the effect of inventory management practices on supply chain performance of cement manufacturing firms in Kenya. Cement firms are the major consumers of imported and local bulk materials that are very costly hence the need for proper management. The specific objectives were to establish the effect of economic order quantity and electronic inventory management on supply chain performance among cement manufacturing firms in Kenya. The theories of transactional cost, inventory cost and theory of constraints anchored the study. A descriptive research design was adopted by the study. The target population was 8 cement manufacturing firms as the unit of analysis while the respondents being unit of observation were 167 staff from procurement or supply chain departments and their equivalents from these firms. Using the Kothari formula, the sample size was 167 employees who were randomly selected using the stratified random sampling technique. The study collected primary data using questionnaires and secondary data using data collection sheet. Descriptive statistics were used in the analysis and obtain means and standard deviations. The study established that Economic Order Quantity and electronic inventory management were all practiced and they significantly affected supply chain performance of the cement manufacturing firms in Kenya. The study concludes that inventory management practices have significant effect on supply chain performance. The study recommends that procurement and supply chain managers of the cement manufacturing firms in Kenya ought to adopt modern state of the art technologies to support inventory planning and scheduling processes, they should increase the number of suppliers that they have partnered with for an improvement in supply chain performance, they should fully leverage the EOQ to minimize on ordering and holding costs thus enhancing supply chain performance and invest in modern technologies to support electronic inventory management thus enhancing supply chain performance.

Key Words: Inventory Management Practices, Inventory Planning and Scheduling Strategic Supplier Partnerships and Supply Chain Performance

INTRODUCTION

Inventory in any organization is important as it ties down a lot of the resources, hence need for installing proper practices for its management. Sound management of inventory can be a source for increased performance and ultimately a basis for competitive advantage of the organization (Tiwari, Wee & Daryanto, 2018). Many organizations across the globe suffer a lot in terms of inventory management which affect their production levels, processing and operation timelines which eventually leads to losses. Njoroge (2015) indicated that for the success of operations within any organization, the management must set prudent measures to control the inventories of that firm which will lead to realization of increased performance.

Too much stock leads to organizational funds being tied down, deterioration of products, products becoming obsolete, misuse and robbery of the products. But on the other hand, shortage in supply of stocks may lead to interruption of production process, underutilization of equipment, machines and staff, unsatisfied customers and poor consumer relations. Therefore, there is need for initiating proper inventory management practices to ensure balance in terms of stock. Inventories do not only refer to stocks but also cover work-in-progress, consumables like spare parts, unused materials and finished goods. While looking at inventory management, it will be prudent to cover its aspects which inventory planning and scheduling, strategic supplier partnerships, economic order quantity and computerized inventory management (Kamakia, 2015).

Managing inventory involves checking the availability of resources and materials, its quantities and quality as when and where it is required in the production process (Sharma & Arya, 2016). Properly executing and following the inventory management techniques enhances profits and minimizes production costs such as storage by providing materials when and where they are needed (Iasya & Handayati, 2015). Through the study, the manufacturing companies that adopted economic order quantity technique were able to optimize their purchases, avoided stock-outs, maintained safety of materials and stocks and continuous flow of production. Another technique was bar coding which was found to be an efficient technique in management of inventory and their movement within the warehouse.

In many instances, many organizations hold more than necessary inventory and low customer service, which is unnecessary as inventories should not be excessive or inadequate but just optimal to achieve the stated objectives. Iasya and Handayati (2015) revealed that firms have huge amounts held up in inventories, and those that neglect having a sound inventory management technique risk failure of its operations and ultimately long-term profitability and its sustainability. It is therefore absolutely imperative to manage inventories efficiently and effectively in order to ignore the unnecessary investments. Reduction of excessive inventories has a direct positive impact on performance and profitability of a company.

Inventory management is key in building competitiveness among manufacturing organizations. Firms in the manufacturing sector face challenges in inventory management that lead to overproduction, underproduction, issues with stock-outs, delays in raw materials delivery and inaccurate inventory records. These challenges negatively affect the performance and sustainability of these SMEs, further begging credence to the need for effective inventory management that lead to improved performance among the SMEs in the manufacturing sector. Furthermore, proper documentation, sound record keeping, proper planning of inventory ordering, distribution and usage significantly influence management of inventories.

The manufacturing sector in Kenya covers firms in the garments sector, the agro-processing firms, plastics, paper, chemicals, pharmaceuticals, engineering products, automotive and assembly components, electronics and processing firms who make products for the domestic and the international markets. According to the KNBS report of 2016, the manufacturing sector contributes approximately 10% of the national gross domestic product (GDP) and the sector has been growing from 3.2% in 2014, 3.5% in 2015, and 3.8% by the end of the year 2016. Although the sector has been growing, the growth rate is slow and even slower when compared to the economy growth rate. For instance, the economy grew by 5.6% in 2015 but the manufacturing sector only grew by 3.5%, meaning that a lot needs to be done for the sector to grow.

Kenya has six listed cement companies, namely Bamburi Cement; East African Portland Cement, Savannah Cement, ARM, Africa limited which was formerly known as Athi River Mining Limited, National Cement and Mombasa Cement. The huge demand for housing and mega infrastructure projects including the SGR, Lamu Port and major road construction, and as the construction sector grows, cement industries have also grown. The cement production and the consumption of the product has grown from 154, 000 Tons in 2005 to 564,000 tons at the beginning of 2017 and the trend is still upward. Further growth and expansion in the sector can be due to access to finances and markets local, regional and international ones and adopting management practices for enhanced performance.

Statement of the Problem

Firms employ inventory management practices due to its benefits and these practices are considered a valuable asset to an organization as it helps in reducing operational costs, maximizes revenues gained and increases sales. At times organizations fail in managing its inventories which lead to reduced productivity, increase in production costs and resource wastages as noted by Nzuza (2015). Furthermore, no adoption of inventory management practices has a negative effect on the performance of the supply chain, as it becomes difficult to accurately and transparently follow inventories across the supply chain.

Several studies have been done on inventory management practices and supply chain performance, for instance, in Malaysia, Radzuan, *et al.* (2015) on practices for inventory management and its effects on vendor managed inventory performance, revealing that the visibility of inventory control limits predicted the service performance. Musau, *et al*. (2017) assessed how organizational performance is affected by inventories in the textile manufacturing firms. The findings show that inventory management positively influence performance of textile firms, this study covered organizational performance in general and did not concentrate on supply chain performance. Gitau (2016) covered organizational productivity in parastatals through management of inventories, the findings show that parastatals used EOQ to estimate when and how much to order, using vendor managed inventory helped them maintain good working relations with suppliers which reduced expenses of ordering, shipping and counting materials. These studies covered inventory management practices aspects but in different sectors of the economy, textiles, petroleum marketing, parastatals and construction sector, thus creating a knowledge gap as none has look at cement manufacturing sector and the case of supply chain performance.

Therefore, this study sought to establish the effect of inventory management practices on supply chain performance of cement manufacturing firms in Kenya. Cement manufacturing firms holds a lot of costly inventory in the form of raw materials and spares which if not well

managed it can put the companies at a risk. Many of these companies have huge hips of bulk materials received and stored out in the yards.

Objectives of the Study

1. To establish the effect of economic order quantity on supply chain performance of cement manufacturing firms in Kenya
2. To examine the effect of electronic inventory management on supply chain performance of cement manufacturing firms in Kenya

LITERATURE REVIEW

Theoretical Review

The study will be anchored on these theories, the transaction cost theory which was established by Halldorsson in 2007; the inventory control theory founded by Zappone (2014) and theory of constraints by Goldratt (1990). The relevance to the study of these theories is discussed in the subsequent sections.

Transaction Cost Theory

This theory was developed by Halldorsson in 2007 which makes a lot of effort in ensuring that all costs and charges across the entire supply chain practice is kept at its bear minimal. The theory is part of the corporate governance within the organization and its main principle is such that costs will always rise whenever an organization gets external forces to conduct the organizational activities. Whenever the organization has more than one department, then it will incur costs pertaining to transactions that occur across the department and other business units. This interaction covers aspects that deal with asset specification, certainty and frequency detailed within the corporate culture (Ghoshal & Moran, 1996). And whenever the organization is dealing with external parties, the transaction costs covers aspects that deal with search and information costs, the section of bargaining and decision making costs and the policing, monitoring and enforcement costs. External parties may include suppliers during purchase of operational components and implementation as well as monitoring and evaluating its quality (Hill, 1990).

Since transaction cost theory is based on cost reduction, North (1990) shares that adopting vertical integration at the work place will reduce transaction expenses and lead to growth of the business. This vertical integration can minimize inventory management costs through increase of the service stage of domestic and foreign customers as well as freeing capital resources for use in other sectors of the organization as per employer's choice and management team. Organization's supply chain cannot minimize transactions any more by means of vertical integration and through cooperation between participating parties to the supply chains but by adopting horizontal integration.

Inventory is one of the important assets/resources of an organization, therefore, it is of value to minimize the transaction costs both internally amongst the department units and externally between the different supply and distribution chains that the organization has. Such actions are fundamental in the quest of increase the performance of the supply chain, thus theory is

relevant in the current study as it covers ways to it cut down costs and improve the effectiveness of inventory.

Inventory Control Theory

This theory was established by Zappone (2014) and its key principle is such that organizations have a lot of assets and managing it becomes quite a challenge. And for the case of large companies who have a wide range of assets and inventories need to have strategy to control and optimize the production and storage of the hundreds of units of inventory while working hard to minimize costs. For the small business units, the owners or managers can easily borrow some ideas on inventory controls, increase their production and cut costs of storage through cost cost-containment and customer service needs.

All organizations and its leadership aim at cutting costs of operation and maximizing returns while meeting and exceeding the demands of the customers, since satisfied customers become loyal to the brand and the business. According to Whitin (1955) having too much inventories raises operational costs, such as consumption of physical space, increase chances of damage, loss, theft and spoilage on top on holding down money in terms of stocks which might lead to cash-flow crises unless the management gets it under control. Often an excess inventory compensates for inefficient and slow leadership, bad estimation, haphazard preparation and insufficient process and operational attention. Too little stock also delays production and increases the probability of a poor customer service. Good customers can in many cases become frustrated and take their business away if the needed service is not available and companies run into financial problems when they keep high volumes of inventories (Ortega & Lin, 2004).

There is also a strong negative relationship between profitability index and cash conversion cycle and at the same time reducing inventories have a significant and positive with financial and operational performance, hence the theory is relevant in explaining the balance needed in amount of inventories so as to increase performance of the supply chain.

Empirical Literature

Economic Order Quantity and Supply Chain Performance

Shaikh, Panda, Sahu and Das (2019) investigated on economic order quantity model for deteriorating item with preservation technology in time dependent demand with partial backlogging and trade credit. It is believed that if the inventory falls to a certain level, the formula of economic order quantity will trigger the need of placing an order for more units. When a business successfully determines a reorder point, it will be able to avoid running out inventory in case there is cost shortage. Economic order quantity takes into account the time used in reordering the incurred costs so as to place an order. When a business firm constantly places a small order quantity that is aimed at maintaining a specific level of inventory, the costs of ordering will be higher and there will be need for additional storage space.

Riza and Purba (2018) investigation was on implementation of economic order quantity for the purposes of reducing the cost of inventory. The study shares that the main purpose of inventory management in an organization is to ensure that labor storage and stock control activities are performed in an efficient and economic manner. The management in organizations is then focused on looking at efficiency in the inventory management procedures basing it on changes inventory levels that keep fluctuating that may lead to

weakness and losses due to low inventory levels, inability to meet production targets and bad employee morale. The study results shows that company inventory storage suffers in terms of late issuance of materials to different operating and processing units and departments which negatively affects inventory service delivery. The management can opt to use economic order quantity (EOQ) as a way to manage inventory, this is the number of orders that an firm does for each time they place an order in such a way as to reduce holding and booking costs. The economic order quantity (EOQ) is one of the oldest production scheduling models that is used on operations management to determine optimal inventory levels that reduce inventory costs.

Chang, Cheng and Soong (2016) investigated on the impacts of inspection errors and trade credits on the economic order quantity model for items with imperfect quality. Economic order quantity refers to the ideal order quantity that a company should purchase to help minimize costs related to holding, ordering and shortage. Economic order quantity plays a key role in helping business organizations control the amount of cash that is tied up in the inventory balance. In most company's inventory is considered as the largest asset which helps the companies meet the needs of their customers. Inventory management is considered as a key factor in any business organization. It is very crucial in controlling organizational resources that are used in the production or exchange of goods and services. The formula of the economic order quantity helps companies in determining reorder point of inventory.

Zhou, Chen, Li and Zhong (2016) conducted a study on synergic economic order quantity model with trade credit, shortages, and imperfect quality and inspection errors. Economic order quantity applies only when the demand of a certain product remains constant over the year and the new orders are fully delivered when the inventory level reaches zero. In economic order quantity, there is a fixed cost for each order that is being placed regardless of the amount of units that have been ordered. It is very important for a company to implement an effective inventory control model to help reduce the stock out and back orders. With regard to this, the involved company will be able to reduce the total costs associated with their inventory and attain its competitive advantage.

Electronic Inventory Management and Supply Chain Performance

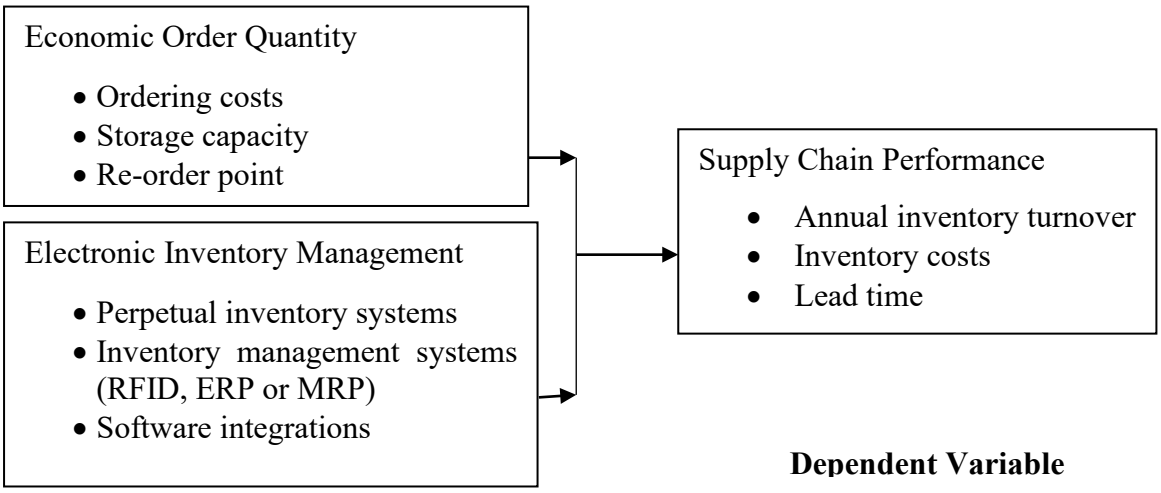
A computerized inventory system is the answer to almost every business owner's needs. Every detail of inventory, from quantity and location to condition and expiry date, is kept in one place. It is a seamless approach to effectively running a successful business and gives advantages even for small businesses, inventory management software is a game-changer (Parpia & Singh, 2016). Furthermore, the inventory management systems have progressed in sophistication and precision through the advent of the computer and modern applications and systems. Perpetual inventory systems have been developed to track and update inventory quantity and availability on a continuous basis as a function of doing business. The others included inventory management systems like enterprise resource planning that is used to enhance the supply chain and improve the performance of many production units and firms. The use of the automated systems is based on having an easy to use system interface, training and support for the staff and having proper documentation and storage of data that can ease the supply chain process and improve firm performance (Abdel-Basset, Manogaran & Mohamed, 2018).

Mlay (2020) looked at the factors that make organizations adopt computerized inventory management and what their influence is on the performance of the organization. The focus of the study was adoption of computerized inventory management systems and specifically the

enterprise resource planning (ERP) and how it impacts the performance of supermarkets in Dar es Salaam. The factors under consideration were technological, organizational and environmental factors that influence adoption of computerized inventory management. Primary data was collected from the five supermarkets and its staff using questionnaires and the data analyzed by descriptive and regression means. On technological factors with aspects like complexity, compatibility, infrastructure and level of technology influenced its adoption; the organizational factors included firm size, resources, management experience and expertise knowledge and expected benefits and environmental factors like competitiveness in the market and industry, strength and authority of the suppliers and support from government. All these factors were found to influence the performance of the supermarkets which is measured in terms of profit margins, customer satisfaction, accuracy in forecasts made and excellent inventory management. The study revealed that technological adoption led to improved performance of the firms.

Shee, Miah, Fairfield and Pujawan (2018) considered how cloud-enabled processes integration impacted the supply chain performance and sustainability of the firm and looked into the role that the top management team of the firm played. The focus of the study was to assess supply chain performance in the context of cloud-based technologies and the influence that top management had in the process. The data was collected from 105 retail firms in Australia and the findings reveal that use of cloud-based technologies positively impacted the supply chain integration and which enhanced the performance of supply chain in the retail firms. The top management as moderating variable, findings showed that it led to improved supplier, customer and internal integration that resulted in improved supply chain performance. The conclusions drawn are that cloud-based technologies are a key part of the modern firms that seek to improve their supply chain performance and integration efforts of the suppliers, buyers, customers and internally within organizations.

Conceptual Framework



RESEARCH METHODOLOGY

Descriptive research design was adopted by the study. The aim of descriptive research is to determine and report how things are without manipulation that helps to determine the current state of the study population (Tetnowski, 2015). The research targeted all eight cement manufacturing companies in Kenya. The respondents were 167 employees in the procurement/supply chain departments or their equivalent from these companies. The sampling frame of this study was a list of cement manufacturing companies in Kenya available at the Kenya Association of Manufacturers (KAM). The sample size of the population was 116 which was arrived at by calculating the target population of 167 employees using the Kothari 2004 formula, while using the 95% confidence level and the error term at 0.05. The Kothari (2004) formula is as follows:

$$n = \frac{z^2.N.\partial_p^2}{(N-1)e^2 + z^2\partial_p^2}$$

$$n = \frac{1.96^2*167*0.5^2}{(167-1)0.05^2+1.96^2*0.5^2}$$

$$= \frac{160.3868}{1.3755}$$

$$n=116$$

The study used questionnaires to collect primary data. The researcher engaged eight research assistants to help in data collection process, one for each cement company. The gathered information was evaluated using quantitative methods. The quantitative data was analyzed using descriptive statistics in which the answers from the data collection sheet are sized, tabulated and analyzed in percentages, frequencies, mean and standard deviation using the Statistical Package for Social Sciences (SPSS V 23.0), which according to Duffield, Stowe and Shankar (2014) is capable of handling large amounts of data and is efficient due to its wide range of statistics.

Besides the descriptive statistics, inferential statistics covering regression analysis was also used with the model as specified below:

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon}$$

Where:

Y = Supply Chain Performance
X_3 = Economic Order Quantity
X_4= Electronic Inventory Management
B = Constant,

β_1, β_2, β_3 and β_4= Regression Coefficients

ε = Error Term

RESEARCH FINDINGS

The study was conducted among the 116 employees of the Cement manufacturing companies in Kenya. From the 116 questionnaires that were administered to the respondents, 85 of them were completely filled up and collected by the researcher. This gave a response rate of 73.3% which was adequate and consistent with Babbie (2010) who shared that an above 70% response rate is ideal for presentation of the findings.

The results show that while 50.6% of the respondents had worked in their organization for 11 years and above, 37.6% had worked for 6-10 years and 13.8% for less than 5 years. On the years of Experience in the cement manufacturing industry, 42.4% of the respondents had worked in the cement manufacturing industry for over 16 years, 2.4% had worked for 6-10 years. The findings on market share of the studied firms show that majority (42.4%) of the studied firms had a market share of 6-10%, only 2.4% had above 21% market share. This means that the studied manufacturing firms had potential to grow and expand their market shares in future perhaps by leveraging their inventory management practices in place.

Economic Order Quantity

The findings of descriptive statistics on EOQ were determined and summarized as shown in Table 1.

Table 1: Economic Order Quantity

Statement	Mean	Std. Dev
Our company has determined the ideal order quantity of raw materials to help minimize costs in holding stock	3.76	.734
We use EOQ to determine the ideal stock levels for raw materials	3.69	.787
The ideal stock quantities has helped in management of stock ordering costs	3.64	.855
There is consistent production process based on having ideal stock quantities	4.04	.738
The ideal stock quantities has helped the Company avoid unnecessary sale costs	3.91	.875
Determination of ideal stock quantities has helped the Company manage its inventory holding cost	3.92	.703
Our firm can manage the inventory re-order costs through EOQs determination of stock quantities	3.84	.567
Determination of ideal stock quantities has helped the Company manage take on all order sizes	3.69	1.112
Determination of ideal stock quantities has helped the Company manage stock outs	3.71	.825
Average	**3.80**	**.800**

The value of average in Table 1 is given as (M=3.80), which is interpreted to imply that EOQ was practiced as a means of managing inventories in the studied firms. Similarly, Sremac, Kazimieras Zavadskas, Matić, Kopić and Stević (2019) view the use of economic order quantity as a valuable component based on the fact that supply chain management is a complex process that is characterized by uncertainty as dictated by changes in the markets. Respondents agreed that there was consistent production process based on having ideal stock quantities (M=4.04), determination of ideal stock quantities had helped the company manage

its inventory holding cost (M=3.92) and that ideal stock quantities had helped the company avoid unnecessary sale costs (M=3.91). These findings are supported by Çalışkan (2020) who share that adoption and use of economic order quantity model forms the foundation for inventory management since it determines the inventory holding costs that is made of warehousing/storage costs and financial costs due to opportunity cost of the capital tied down in inventories.

Respondents were of the opinion that their firm could manage the inventory re-order costs through EOQs determination of stock quantities (M=3.84), the company had determined the ideal order quantity of raw materials to help minimize costs in holding stock (M=3.76) and that determination of ideal stock quantities had helped the Company manage stock outs (M=3.71). Çalışkan (2020) share that adoption and use of economic order quantity model forms the foundation for inventory management since it determines the inventory holding costs that is made of warehousing/storage costs and financial costs due to opportunity cost of the capital tied down in inventories. Respondents said that determination of ideal stock quantities had helped the Company manage take on all order sizes (M=3.69), EOQ was used to determine the ideal stock levels for raw materials (M=3.69) and that the ideal stock quantities had helped in management of stock ordering costs (M=3.64). Liao, Huang, Chung, Lin, Chuang and Srivastava (2020) shares that EOQ model has been applied in response to the challenge of the inventory problem by stating the optimal replenishment cycle time to avoid excessive holding costs that may lead to deteriorating stocks and losses through rot and theft.

Electronic Inventory Management

Table 2 is a summary of descriptive statistics on electronic inventory management

Table 2: Electronic Inventory Management

Statement	Mean	Std. Dev
Our company has adopted computerized inventory system to update inventory quantities	3.63	.870
Departments can easily communicate their inventory needs by a click of the button	3.83	.857
Inventory managers easily place orders with suppliers for different stock items	4.05	.729
Our company uses different inventory systems in the supply chain	3.76	.934
All the staffs are trained on use of computer systems to ease the inventory management process	3.78	.952
The company has made a point to use inventory systems that have an easy to use computer interface system	3.75	.962
The top managers support automation of inventory management by setting aside a budget for acquisition of the system	3.98	.626
All staff are trained on using computerized inventory systems	3.57	.821
Computerized inventory management system allows for information sharing(orders, re-order points, type of inventories and invoicing)	3.95	.738
Average	**3.81**	**0.832**

The findings in Table 2 indicate the value of average as 3.81; this means that there was electronic inventory management in the studied firms. Mlay (2020) views a computerized inventory system as the integration of several sub-functions into a single cohesive system and

that the ordering process, re-order points and departmental inventory needs are included into one system that inventory managers use to handle all the management and controls for the organizational inventories. Respondents agreed that inventory managers easily placed orders with suppliers for different stock items (M=4.05), the top managers supported automation of inventory management by setting aside a budget for acquisition of the system (M=3.98) and that computerized inventory management system allows for information sharing (orders, re-order points, type of inventories and invoicing) (M=3.95). This is supported by Schuster, Ferry, Fulbright, Jellison, Basu and Gable (2019) who noted that electronic inventory management enables any business entity to monitor the inventory levels in real time at any time. The software allows the management team in an organization to be able to update all inventory orders, counts and sales and make decisions based on the collected information.

It emerged that departments could easily communicate their inventory needs by a click of the button (M=3.83), all the staffs were trained on use of computer systems to ease the inventory management process (M=3.78), the company used different inventory systems in the supply chain (M=3.76) and that the company had made a point to use inventory systems that have an easy to use computer interface system (M=3.75). It emerged that the company had adopted computerized inventory system to update inventory quantities (M=3.63) and that all staff were trained on using computerized inventory systems (M=3.57). Mlay (2020) views a computerized inventory system as the integration of several sub-functions into a single cohesive system and that the ordering process, re-order points and departmental inventory needs are included into one system that inventory managers use to handle all the management and controls for the organizational inventories.

Supply Chain Performance

Table 3 is a breakdown of the findings on supply chain performance

Table 3: Supply Chain Performance

Statement	Mean	Std. Dev
The overall costs associated with ordering inventory has been optimized	3.63	.594
Costs associated with inventory dispatch have been optimized	3.75	.670
Overall efficiency in the supply chain has improved	3.52	.880
Stock outs have been eliminated in our company	4.04	.554
The costs of holding finished products have been kept at the minimal point in our company	3.61	.708
Costs of tracking inventory have been minimized	3.69	.802
Average	**3.71**	**.701**

The results in Table 3give the value of average as (M=3.71), this shows that majority of the respondents agreed on the various statements provided under supply chain performance of their respective firms.

Regression Results

This section details the findings of regression analysis with Table 4.31 indicating the regression model summary.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.852[a]	.726	.713	.87667

From Table 4, the value of R square is given as .726, which is interpreted to imply that 72.6% change in supply chain performance of the cement manufacturing firms in Kenya is explained by the inventory management practices in place. Table 5 is an overview of the ANOVA.

Table 5: ANOVA

ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Regression	163.292	2	40.823	53.117	.000[b]
Residual	61.484	82	.769		
Total	**224.776**	**84**			

Table 5 gives the ANOVA findings. From the results, F calculated value is given as 53.117 with $p<0.05$. This is a clear indication that the regression model used in the study was significant. Table 6 is a summary of the beta coefficients and significance.

Table 6: Coefficients and Significance

		Unstandardized Coefficients		Standardized Coefficients		
Variable		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)		2.483	2.221		1.118	.267
Economic Order Quantity		.195	.051	.113	3.824	.026
Electronic Inventory Management		.552	.042	.833	13.258	.000

The findings in Table 4.33 results into the following predicted model:

$$\mathbf{Y = 2.483 + 0.195X_1 + 0.552X_2}$$

Where:

Y = Supply Chain Performance

X_1 = Economic Order Quantity

X_2= Electronic Inventory Management

Economic order quantity ($\beta=.195$, $p<0.05$) had significant effect on supply chain performance of the cement manufacturing firms in Kenya. This finding is supported by Singh, Khurana and Tayal (2016) who said that economic order quantity model provides an optimum solution that is in a closed form to help in knowing and understanding the behavior of the inventory system. Mulyana and Zuliana (2019) show that EOQ method is ideal in controlling raw material inventories for SMEs like Ananda Brownis Bakeries in South Africa.

Electronic inventory management ($\beta=.552$, $p<0.05$) supply chain performance of the cement manufacturing firms in Kenya. This finding is supported by Saleem (2020) who noted that use of automated inventory management systems led to reduced lead times, cut down operational costs, use of little amounts of labor thus low labor costs and reduction in labor

shortages, leading to efficient supply chain management and performance of the manufacturing firms.

CONCLUSION AND RECOMMENDATIONS

Conclusions

The study sought to determine the effect of inventory planning and scheduling on supply chain performance of cement manufacturing firms in Kenya. Based on descriptive statistics, the study concludes that cement manufacturing firms in Kenya have put in place inventory planning and scheduling.

This study was set out to establish the effect of economic order quantity on supply chain performance of cement manufacturing firms in Kenya. In view of the descriptive statistics, the study concludes that economic order quantity is practiced by the cement manufacturing firms in Kenya. The study further concludes that economic order quantity significantly predicts supply chain performance of the firm.

The last objective sought to examine the effect of electronic inventory management on supply chain performance of cement manufacturing firms in Kenya. Based on descriptive statistics, this study concludes that the cement manufacturing firms in Kenya have adopted electronic inventory management. The study further concludes that the electronic inventory management has significantly contributed to supply chain performance of the cement manufacturing firms in Kenya.

Recommendations of the Study

Based on regression results, the study recommends that the procurement and supply chain managers of the cement manufacturing firms in Kenya should adopt modern state of the art technologies to support inventory planning and scheduling processes.

The procurement and supply chain managers of the cement manufacturing firms in Kenya should increase the number of suppliers that they have partnered with for an improvement in supply chain performance.

The procurement and supply chain managers of the cement manufacturing firms in Kenya should fully leverage the EOQ to minimize on ordering and holding costs thus enhancing supply chain performance.

The procurement and supply chain managers of the cement manufacturing firms in Kenya should invest in modern technologies to support electronic inventory management thus enhancing supply chain performance.

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