EFFECT OF ECONOMIC ORDER QUANTITY ON ORGANIZATIONAL PERFORMANCE OF SUGAR MANUFACTURING FIRMS IN KENYA

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ABSTRACT: In today's world of intense competition managing inventory efficiently has become an important operational weapon for products and service firms wishing to survive the competitive pressures. The main aim of this study was to analyze the effect of economic order quantity adoption on organizational performance of sugar manufacturing firms in Kenya. The study was guided by Economic order theory. This study was anchored correlational research design. The target population for this study was 144 respondents consisting of; procurement managers, stores managers, chief engineers, dry production managers, field supervisors, volume supervisors, finance managers, marketing managers and factory managers. The study used simple random sampling to select 108 respondents. Primary data was collected through the use of questionnaires while secondary data were collected from financial statements. Expert analysis and factor analysis were used to assess the construct validity of the questionnaire. Reliability of primary data was measured using Cronbach alpha. Descriptive statistic such as frequencies and percentages were generated. Inferential statistics consisted of multiple regression and Pearson correlation coefficient. Results were presented in form of tables' charts and graphs. The results show that economic order quantity adoption had a positive and significant effect on organizational performance with a regression coefficient of 0.988. Economic order quantity causes 61.6% variation in organizational performance. The results will help managers of sugar firms to come up with regulations that enhance cost reductions and improve organizational efficiency. The study would also act as a source of reference material for future researchers on inventory management practices. The study concluded that economic order quantity adoption had positive and significant effect on financial performance. The study recommended that sugar firms should train procurement officers who will be able to adopt economic order quantity effectively.

I.   Background of the Study

In the current era characterized by fierce competition driven by globalization, heightened consumer consciousness, and technological advancements, firms aspiring for significant success must consistently emphasize the availability of their services. This is crucial since consumers have the opportunity to easily shift their attention to other alternatives. Therefore, effectively managing inventory has become a crucial strategic tool for both product and service companies aiming to withstand competitive challenges. The majority of these companies maintain inventories in order to fulfill their clients' requirements. Inventory is the largest component of current assets for these enterprises. Due to the substantial size of their inventories, a significant amount of funds is allocated to inventory holding. Therefore, it is crucial to use advanced strategies for inventory management in order to prevent missed sales, expenses related to adjusting production rates, overtime charges, subcontracting fees, and fines for backorders during periods of high demand (Lysons & Farrington, 2016).

In the realm of supply chain management, inventory management plays a pivotal role in the operations of manufacturing firms. Efficient management of inventory not only ensures smooth operations but also significantly impacts the financial performance and competitiveness of organizations. Economic Order Quantity (EOQ) is a widely recognized inventory management model that aims to optimize inventory levels by balancing holding costs and ordering costs. While EOQ has been extensively studied in various industries globally, its adoption and impact on organizational performance within the context of the sugar manufacturing sector in Kenya remain relatively underexplored (Ismail, Shale & Anthony, 2022).

Kenya's sugar industry represents a crucial sector of the economy, contributing significantly to employment, GDP, and foreign exchange earnings. However, the industry has faced numerous challenges, including inefficiencies in production and distribution, which have hampered its competitiveness and sustainability. In such a context, effective

inventory management practices become imperative for sugar manufacturing firms to enhance operational efficiency and overall performance(Charles,Makau & Noor, 2019).

Globally firms are adopting many several strategies so as to improve performance. As competition intensifies, organizations face the ever-increasing challenge of delivering goods and services to the intended clients at the right time while taking into consideration the costs involved. Inventory management is generally aimed at improving the creation of customer value. Companies need to work with chain members to meet consumer demand and maximize business profits. A logistics cost survey conducted in the European Union found that inventory costs accounted for 13% of total logistics costs while warehouse costs accounted for 24% (Lewin, 2017).

Several firms have persistently encountered difficulties in managing their inventory. Given the assumption that effective inventory management plays a crucial role in service delivery, customer happiness, and enhanced performance. Firms of all sizes and types, including both public and private entities, at both local and global levels, are invariably focused on inventory management. Most firms endeavor to attain optimal control over their inventory while simultaneously lowering inventory expenses. Inventory control is utilized by numerous firms in both the private and public sectors. Its purpose is twofold: to guarantee the prompt availability of components and products, and to enhance customer service and gain a competitive edge. Although most firms employ internal inventory procedures to attain organizational goals such as increased efficiency and enhanced procurement processes, the implementation of good internal inventory management methods has proven to be a difficult task for many (Lardenoije, Van Raaij & Van Weele, 2020).

In America, inventory accounts for approximately 60% of the annual revenue generated by industrial companies in the United States. This clearly demonstrates the importance of prioritizing inventory management to mitigate avoidable expenses. Indeed, any aspect of the company's operations that generates more than 50% of its revenue undoubtedly warrants significant managerial focus. Several organizations are adopting sustainability measures in inventory management as a result of demands from customers, investors, and even employees. Over the past few years, several businesses have encountered a multitude of difficulties, particularly in the areas of inventory management and material control, which have consequently had an impact on the overall performance of these enterprises (Klewitz & Hansen, 2017).

In Nigeria, it has been observed that despite the efforts of most firms to implement effective inventory management practices, they still have issues related to insufficient inventory. As a result, this has an impact on their manufacturing process, resulting in a shortage of either one brand of their products or the other. This, in turn, has a detrimental effect on their profitability and overall effectiveness. Effective inventory management significantly influences the operational efficiency and productivity of an organization. The profitability of an organization is closely linked to the quantity of items sold, which is directly influenced by the product quality (Kannan & Tan, 2015).

Kenyan companies are progressively implementing inventory control systems and adopting inventory control methods to address the existing issues in inventory management. The majority of firms in Kenya utilize inventory control systems as a means of gaining a competitive advantage and enhancing their financial performance. Kenya's state corporations have undergone extensive reforms, facilitated by government task teams and session papers. These reforms aim to enhance the corporations' efficiency, effectiveness in fulfilling their responsibilities, and alleviate the financial burden they impose on the public treasury. Considerable endeavor has been invested in ensuring that these firms achieve not only self-sufficiency but also generate sufficient surplus revenue to financially support the government, after meeting their operational expenses (Kimaiyo & Ochiri, 2016).

Organizational performance refers to the extent to which a company successfully attains its market-oriented objectives and financial targets. It can also be regarded as a collection of financial and nonfinancial indicators that provide information on the extent to which objectives and outcomes have been accomplished. Organizational performance encompasses both the ability to achieve desired outcomes and the ability to do so with optimal use of resources, encompassing both the quality and quantity of work. The assessment of organizational performance varies based on the specific objective of the evaluation. Organizational performance can be assessed based on both financial and nonfinancial indicators. The financial goals include measurements like profitability, return on investment, sales growth, business success, and organizational effectiveness. The non-financial criteria include innovation performance, market share, quality improvement, innovativeness, and resource planning (Kipkorir & Wanyoike, 2015).

Statement of the Problem

Efficient inventory management through economic order quantity plays a crucial role in ensuring smooth service delivery, enhancing customer happiness, and boosting overall performance. Despite implementing inventory management procedures, the performance of the sugar enterprises in the country, particularly the government-owned

ones, continues to be in a state of crisis. Many Kenya sugar manufacturing firms in Kenya have been performing poorly and some have incurred heavy losses leading to collapse of some sugar firms. Some sugar companies do not collect cane from farmers on time due to poor inventory and capacity constraints on their part. There is a significant amount of underutilized capacity, with a notable number of unpaid suppliers, contractors, and farmers accumulating debts. The annual output from the sixteen sugar processors has failed to meet local demand and has not reached the projected amount for the year. The primary issue plaguing Kenya's sugar business is the prolonged and continuous decline in profitability (Muhande & Iravo, 2017). As of December 31, 2021, most factories have incurred substantial debts totaling Ksh. 58 billion. As a result, almost 50% of sugar enterprises in Kenya face a yearly decrease in their financial performance, which ultimately leads to the collapse of major sugar firms such as Mumias Sugar Company. Several companies possess inadequate inventory management systems. Report on the auditor general on Nzoia Sugar Co. ltd dated 30th June 2020 on asset management and factory operations indicated that, items procured vide LPO 5715 and 1681 amounted to Ksh .446, 751 and were paid for without evidence of them being delivered and received meaning that there are poor inventory management systems. This is a room for loses that lead to collapse of these companies. Several farmers are disheartened to cultivate sugar cane, and a few have even resorted to removing the plant entirely. The closure of several sugar companies has resulted in widespread job losses and a decline in economic activity in the region (Lwiki, Ojera & Wachira, 2018). Prior research on economic order quantity has primarily focused on different industries. Individuals in the sugar industry have mostly focused on state-owned sugar companies, neglecting crucial elements of inventory management such as optimal stock levels and vendor-managed inventory. Hence, it is imperative to determine the effect of economic order quantity on organizational performance of sugar production companies in Kenya.

Objective of the Study

To analyze the effect of Economic Order Quantity adoption on organizational performance of sugar manufacturing firms in Kenya.

Hypothesis of the Study

H_{01}: Economic Order Quantity adoption has no significant effect on organizational performance of sugar manufacturing firms in Kenya.

Scope of the study

The study focused on economic order quantity as the dependent variable and organizational performance as the independent variable. The research was conducted in sugar companies in Kenya. Sugar firms are chosen due to their declining performance yet they are key in achieving of the big four agenda. Organizational performance, the dependent variable, was assessed through secondary data gathered from 2020 to 2022. Economic order quantity, the independent variable, were evaluated using primary data acquired in 2023.

Theoretical literature review

The purpose of theory is to provide explanations, predictions, and understanding of occurrences. Additionally, the theory often aim to question and expand upon current knowledge while adhering to fundamental assumptions.

Economic order quantity model

Harris, (2013) established the Economic Order Quantity (EOQ) model in 1913. The model offers the institution a precise recommendation for the most advantageous quantity to order. The optimal quantity, at which total cost is minimized, is determined by the intersection of the holding cost curve and the ordering cost curve. Implementing this practice in institutions can efficiently decrease charges associated with ordering, stock keeping, and thus, overall costs. The Economic Order Quantity (EOQ) is a technique employed to ascertain the optimal quantity to procure or produce in order to minimize expenses related to inventory management and procurement or manufacturing processes.

The Economic Order Quantity (EOQ) model is based on a number of assumptions, including the following: the cost of ordering is fixed, the demand for the year is known and distributed evenly, the lead time is constant, there are no discounts available, and the purchase price is fixed; the model is designed for a single product; stock replenishment is immediate; and the quantity ordered is always in whole batches. Personnel utilize these assumptions to conduct further mathematical computations in order to ascertain the exact quantity of material. Therefore, the EOQ model's usefulness is constrained by these assumptions. The EOQ model is used to determine the optimal quantity for replenishing stock, taking into consideration the trade-off between storage costs and ordering costs. Increasing the quantity of an order reduces the frequency of orders and hence decreases the monthly cost of ordering. However, it also requires maintaining a larger average inventory (Camp, 2010).

The EOQ model aids firms in minimizing inventory management expenses by decreasing the costs associated with ordering and holding goods. Utilizing the computation of Economic Order Quantity (EOQ) allows

institutions to determine the optimal timing and quantity for placing orders, enabling them to establish a stock replacement strategy based on acceptable time intervals. This will result in cost minimization or even zero storage costs in their warehouses, as incoming merchandise is promptly sent. The Economic Order Quantity model necessitates the determination of both the reorder level and the appropriate quantity to order for each item stored (Sandun, Ganesh & Shun-Chen, 2017).

The primary objective of an inventory management in an organization is to minimize expenses and generate revenue by meeting client requests. Excessive inventory occupies physical space, imposes a financial burden, and heightens the likelihood of damage, spoilage, and loss. Additionally, it is important to note that an abundance of inventory often serves as a remedy for substandard and ineffective management, inaccurate predictions, disorganized scheduling, and insufficient focus on operational methods and protocols. Inadequate inventory levels can lead to production disruptions and heighten the probability of delivering subpar customer service. Companies with exceptionally high inventory ratios are more likely to exhibit poor financial performance. Companies that have unusually high levels of inventory experience below-average returns on their stocks. Conversely, companies with unusually low levels of inventory have average stock returns. However, companies with somewhat lower than average inventory levels tend to have the best long-term performance (Choi, 2019).

Conceptual framework

This section shows the aspects of economic order quantity and organizational performance as shown in Figure 1.
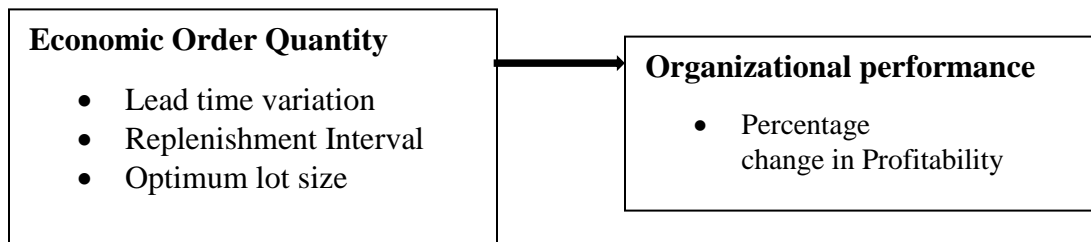

Figure 1: Conceptual framework

Economic Order Quantity

The economic order quantity (EOQ) is the most efficient quantity to order that minimizes the balance between the expenses of maintaining inventory and the costs of placing orders. Positive assumptions are essential. Storing stocks incurs set and predictable expenses, whereas ordering them involves regular rates. The unit cost is predetermined and constant, and replenishment takes place instantaneously with the full batch being provided simultaneously. Stock-outs are strictly prohibited. The Economic Order Quantity (EOQ) aims to ascertain the most efficient order quantity that reduces expenses related to inventory holding and order placement. This model is considered one of the most ancient classical approaches employed in industrial scheduling (Folinas, 2017).

The inventory control formulation is often deemed successful when the company is able to meet its stock requirements for the entire year. The economic order amount enables enterprises to strategically schedule their stock replenishment at regular intervals, such as monthly, quarterly, semi-annually, or annually. By implementing this approach, enterprises can maintain low prices by ensuring that stock is promptly received and sold. The Economic Order Quantity (EOQ) model is most suitable for situations where the product demand remains consistent over time and fresh orders are made only when the inventory level reaches zero. Every order carries a predetermined cost, irrespective of the number of units ordered. EOQ aims to achieve an equilibrium between maintaining excessive or insufficient inventory levels (Gitau, 2016).

Empirical literature review

Hussein and Makori (2018) aimed to examine how inventory management techniques impact the performance of commercial state enterprises in Kenya. A survey employing descriptive research methodology was utilized. The study focused on a sample of 150 employees. The researcher employed the stratified random sample technique due to the heterogeneity of the target population. The study revealed a good and considerable impact of inventory control, specifically in terms of Economic Order Quantity, on performance.

Atieno and Bett (2019) aimed to examine the relationship between inventory management and organizational performance within the steel industry. The study employed a descriptive research design. The study focused on staff in the Quality, Administration, Sales and Marketing, and Production divisions of three steel businesses located in Nairobi County, Kenya. The study included both primary and secondary data collection

methods. Questionnaires were administered using a drop and pick approach for primary data, while secondary data was gathered from the company's published comprehensive profit and loss statement, specifically focusing on the company's sales. A total of 45 respondents were included in the sample size. The research findings confirmed a strong and statistically significant relationship between Economic Order Quantity (EOQ) and the performance of steel manufacturing enterprises.

Ndiwa (2022) examined the impact of supply chain performance and inventory management methods on dairy processing enterprises in Kiambu County. The study examined the theories of constraints, Resource Based View theory, and the Institutional theory. The study utilized a descriptive research design. The study employed a census sampling method to select 96 respondents from the supply chain departments, shops department, and the consumer department of three dairy enterprises in Kiambu. A total of 85 closed-ended questionnaires were completed and returned for data analysis. The regression analysis revealed a statistically significant correlation between the Economic Order Quantity (EOQ) and the performance of the supply chain.

Kipkemoi (2019) aimed to assess the impact of inventory management techniques on the liquidity of public technical training institutes in the Rift Valley Region, Kenya. The study was conducted using the economic order quantity model, which was chosen to coincide with the study's purpose. The study employed a census survey methodology due to a limited number of respondents. The accessible population consisted of 38 responders, with 19 being principals and 19 being accountants. The questionnaires were completed by the individuals themselves. The pilot test was conducted by administering five questionnaires to public technical training schools in the Nyanza region. The inferential statistics employed in the study consisted of product moment correlation analysis and multiple regression. The study results demonstrated that the economic order quantity has a substantial impact on the liquidity of public technical training institutions in the Rift Valley Region.

Lwiki, Ojera, Mugenda, and Wachira (2018) conducted a study to analyze the influence of inventory management methods on the financial performance of sugar producing companies in Kenya. The main data was gathered through the use of structured and semi-structured questionnaires that were given to key individuals within the businesses. The secondary data was acquired from the annual financial performance statements found in the Year Book of sugar statistics. Descriptive statistics were employed to assess the influence of inventory management strategies on Correlation analysis was employed to ascertain the characteristics and extent of the association between inventory management variables. The results demonstrate a positive association between the Economic Order Quantity and financial performance.

II.   METHODOLOGY

Research design

This study utilized a correlational research approach. The chosen design was very suitable for this study due to the specific nature of the variables involved. The study aims to investigate the relationship between economic order quantity and organizational performance.

Target population

The target population for this study was 144 respondents consisting of; procurement managers, stores managers, chief engineers, dry production managers, field supervisors, volume supervisors, finance managers, marketing managers and factory managers.

Table 1: Target Population Table

Category		Number	Percentage
1.	Procurement Managers	16	11.11
2.	Stores Managers	16	11.11
3.	Chief Engineers	16	11.11
4.	Dry production Managers	16	11.11
5.	Field Supervisors	16	11.11
6.	Volume Supervisors	16	11.11
7.	Finance Managers	16	11.11
8.	Marketing Managers	16	11.11
9.	Factory Managers	16	11.11
Total		**144**	**100**

Sample size and sampling technique

The sample size was determined using the formula devised by Yamane.

$$n = \frac{N}{1+N(e)^2} \quad \text{..} \quad (3.1)$$

Where: n = required sample size

e = level of significance taken to be 0.05

N= the population size

1= constant

N= 144

e= 0.05

$$n = \frac{144}{1+144(0.05)^2}$$

=108

A stratified simple random selection method was employed to choose 12 participants from each category. Consequently, the final study included just 108 responses as the participants from the pilot project did not take part in the final survey. Saunders, Lewis, and Adrian (2015) proposed that a pilot study with a target sample size of 5% to 10% is adequate. Therefore, the pilot study included 11 respondents. The specified demographic is displayed in Table 2.

Table 2: Sample population table

Category		Number	Percentage
1.	Procurement Managers	12	11.11
2.	Stores Managers	12	11.11
3.	Chief Engineers	12	11.11
4.	Dry production Managers	12	11.11
5.	Field Supervisors	12	11.11
6.	Volume Supervisors	12	11.11
7.	Finance Managers	12	11.11
8.	Sales and Marketing Managers	12	11.11
9.	Factory Managers	12	11.11
	Total	**108**	**100.00**

Data collection instruments

Questionnaires were utilized to gather primary data on the independent variable. The dependent variable was derived from financial records through the use of secondary data. Closed-ended inquiries were employed. Closed-ended questions were employed due to their ease of administration and evaluation, as well as their cost-effectiveness in terms of both time and money. Questionnaires are cost-effective, straightforward, and unambiguous. Secondary data were collected from audited financial statements.

Pilot test

Piloting was done in Mudete tea factory because it a processing company and may be facing similar challenges as the sugar firms. The pilot study was done using 11 respondents randomly selected which was 10% of the expected target population of 108 respondents.

Reliability analysis

The reliability of primary data was assessed using Cronbach's alpha, which analyzes the consistency of the instrument or how effectively a group of items measures a specific attribute or behavior in the test. A value equal to or greater than 0.70 was deemed adequate. Table 3 displays the Cronbach's Alpha values.

Table 3: Cronbach's alpha reliability

Construct	Number of Items	Cronbach alpha	Conclusion
Economic Order Quantity	10	0.871	Reliable
Organizational Performance	10	0.867	Reliable

Source: Study Data (2023)

The data presented in Table 3 indicates that the economic order quantity and organization performance have Cronbach's Alpha values of 0.871 and 0.867 respectively. All of the Cronbach's Alpha values exceeded 0.7, indicating that all of the constructions were deemed dependable.

Validity

The construct validity of the questionnaire was evaluated using expert analysis and factor analysis. The construct validity of the questionnaire was evaluated using expert analysis and factor analysis. The KMO and Bartlett's Tests are displayed in Table 4.2.

Table 4: KMO and Bartlett's Tests

	Items retained	KMO	Bartlett's test		
			χ^2	df	p-value
Economic Order Quantity	10	0.901	681.791	45	0.000
Organizational Performance	10	0.866	657.674	45	0.000

Source: Study Data (2023)

The results in Table 4 indicate that the data for all the constructions being studied were deemed appropriate, since they were above a threshold of 0.8. The Bartlett's chi-square value is less than 0.05, indicating statistical significance at a 95% confidence level.

Data collection procedure

The researcher collected primary data with the assistance of a research assistant. Questionnaires were delivered to all the sugar firms. A three-week period was allocated to offer the respondents sufficient time to complete the questionnaires. The collecting of secondary data involved the utilization of a data collection sheet to systematically organize the components of the dependent variable. The questionnaires were collected back and summarized for data analysis. The data was collected from West Kenya Sugar Company ltd.

Data processing, analysis and presentation

Data analysis involves the examination of the collected data and making conclusions. It involves reduction of a huge data into manageable size that will be easy to understand. The data underwent coding and thorough examination to identify any flaws or omissions. The data was subsequently inputted into a computer for the calculation of descriptive statistics using a statistical tool for social sciences. Data analysis involved the utilization of descriptive statistics, specifically frequencies and percentages, to display and analyze the data. The study utilized inferential statistics, specifically multiple regression analysis, to forecast the value of the dependent variable by considering the independent variable(s) as predictors. The coefficient of determination (r2) generated from the linear regression was utilized to measure the goodness of fit. To establish the relative impact of each of the independent factors on the dependent variable beta coefficient was used to test for significance at 5% significance level. The Pearson correlation coefficient was employed to quantify the degree of association between two variables.

An innovation index (I) ranging between 0 and 1 was computed from independent variable using the formula in (3.1) for computing relative importance based on a 5-point Likert scale ranking for economic order quantity. The indices interpretation according to Kassem, Khoiry, and Hamzah, (2020) was as per Table 4.

$$I = \frac{\sum (W \times n)}{H \times N} \quad \text{...(3.1)}$$

Where:
I- Innovation index/Sustainability Index
W-Weighting by respondent from the Likert scale e.g., 1, 2, 3, 4 and 5
n- Frequency of responses
N- Total number of respondents
H-Highest weight from the Likert scale i.e., 5

Table 4: Index Interpretation

Index	Ranking
0-0.19	Very low
0.20-0.39	Low
0.40-0.59	Moderate
0.60-0.79	High
0.80-1.00	Very High

Source; Kassem et al. (2020); Sakhare and Patil (2019)

The following linear regression model was used to test the linear relationships between individual independent variables and the dependent variable.

$$Y = \beta_0 + \beta_1 EOQ + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.2)$$

Where:
Y= Organizational Performance EOQ = Economic Order quantity
B0= Regression Constant
B1= Regression Beta Coefficient
ε = Error term

III.   RESEARCH FINDINGS AND DISCUSSION

Descriptive statistics

Respondents were asked a question regarding whether the economic order quantity minimizes stock holding costs. From 92 respondents, 13.0% strongly disagreed, 12.0% disagreed, 8.7% remained neutral, 40.2% agreed and 26.1% strongly agreed. This implies that economic order quantity enables organizations to order a sizeable level of quantity that is able to meet customers demand within the shortest time thus being able to reduce the cost used for storing the large inventory.

A question regarding on whether economic order quantity minimizes obsolete stock was asked. Majority of the respondents at agreed and strongly agreed at 35.9% and 20.7% respectively that economic order quantity minimizes obsolete stock. This implies that economic order quantity helps companies to order stock only after the available stock has reached a level that cannot sustain customer's demand. This may help the company to get rid of the stock without demand in the organization thus reducing obsolete stock. Reducing obsolete inventory can boost an organizations financial health. It can lower overall inventory costs and the losses that come with writing off this stock.

Respondents were asked a question regarding on whether economic order quantity guarantees high accuracy by focusing on demand. The results shows that from 92 respondents, 18.5% strongly disagreed, 29.3% disagreed, 13.0% were neutral, 22.8% agreed and 16.3% strongly agrees that economic order quantity guarantees high accuracy by focusing on demand. This depicts that majority of the companies have not used economic order quantity effectively and efficiently in ordering the sizeable required inventory. Thus, such companies may not be able to use economic order quantity to guarantee stock accuracy. In few companies, economic order quantity enables company to determine the period at which stock should be replenished thus being able to use economic order quantity to guaranty high accuracy by focusing on customers demand.

Regarding the question on whether economic order quantity reduces stock ordering costs, most of the respondents agreed and strongly agreed with 29.3% and 30.4% that economic order quantity reduces stock ordering costs. This implies that economic order quantity in manufacturing firms helps firms to maintain and order sizeable inventory level that is able to meet customer demands. Through economic order quantity, firms may be able to identify the stock to be ordered so as to avoid frequent ordering which will later reduce ordering cost in an organization.

Participant in this study were asked to give an opinion on whether economic order quantity reduces lead time. The findings shows that from 92 respondents, 15.2% strongly disagreed, 14.1% disagreed, 12.0% remained neutral, 33.7% agreed and 25.0% strongly agreed that economic order quantity reduces lead time. This implies that manufacturing firms are able to identify the optimum stock level to be ordered. This may reduce the chances of an organization ordering inadequate stock that's unable to meet customers' demand thus reducing frequent ordering. Reduction in frequent ordering will also lead to reduction in the number of lead time.

Respondents were asked a question to assess on whether Economic order quantity reduces storage costs. Majority of the participants agreed and strongly agreed at 59.8% that economic order quantity reduces storage costs. This depicts that adherence to economic order quantity helps manufacturing firms to order inventory that is only capable of meeting customers' demands. It enables an organization to reduce holding unnecessary stock that is not immediately required by the customers. This reduced the number of stocks that is hold by an organization hence storage cost also reduced.

Regarding the question on whether economic order quantity leads to determination of optimum lot size, respondents strongly disagreed, disagreed and remained neutral at 54.2% economic order quantity leads to determination of optimum lot size. This implies that demand of customers from one period to another is not constant

as it keeps on fluctuating. This makes it difficult for these firms to use economic order quantity to determine the exact optimum size that will benefit the firm.

Respondents were asked a question to determine whether economic order quantity reduces replenishment. The findings shows that majority of the respondents strongly disagreed, disagreed and remained neutral with 52.4% that economic order quantity reduces replenishment. This depicts that in most firms, the demand from customers keeps on changing from one period to another. It is therefore difficult to determine an economic order quantity that is able to give the level of stock that can minimize frequent stock ordering. Therefore, replenishment will also keep on fluctuating from one period to another.

Respondents were asked a question to assess on whether Economic order quantity minimizes storage costs. Majority of the participants agreed and strongly agreed at 59.8% that economic order quantity minimizes storage costs. This depicts that adherence to economic order quantity helps manufacturing firms to order inventory that is only capable of meeting customers' demands. Economic order quantity enables an organization to reduce holding unnecessary stock that is not immediately required by the customers. This reduced the number of stocks that is hold by an organization hence storage cost is also minimized.

A question was asked to determine the respondents' perception regarding whether economic order quantity leads to improved organizational performance. The findings shows that most of the respondents agreed and strongly agreed at 52.0% that economic order quantity leads to improved organizational performance. This depicts that economic order quantity enables firms to order optimum size of stock that is able to meet customer's demand. Stock is only replenished when it reaches reorder level. This helps firms to reduce holding cost and ordering cost. Reduction in cost improves the profits generated by manufacturing firms hence improving organizational performance.

Table 5: Descriptive statistics of economic order quantity

Statements	SD	D	N	A	SA
Econo1mic order quantity minimizes stock holding costs	12	11	8	37	24
	13%	12%	8.7%	40.2%	26.1%
Economic order quantity minimizes obsolete stock	12	15	13	33	19
	13%	16.3%	14.1%	35.9%	20.7%
Economic order quantity guarantees high accuracy by focusing on demand	17	27	12	21	15
	18.5%	29.3%	13.0%	22.8%	16.3%
Economic order quantity reduces stock ordering costs	10	13	14	27	28
	10.9%	14.1%	15.2%	29.3%	30.4%
Economic order quantity reduces lead time	14	13	11	31	23
	15.2%	14.1%	12.0%	33.7%	25.0%
Economic order quantity reduces storage costs	17	13	7	33	22
	18.5%	14.1%	7.6%	35.9%	23.9%
Economic order quantity leads to determination of optimum lot size	12	25	13	19	23
	13%	27.2%	14.1%	20.7%	25.0%
Economic order quantity reduces replenishment	20	24	7	23	18
	21.7%	26.1%	7.6%	25.0%	19.6%
Use of Economic order quantity minimizes storage costs	12	13	12	32	23
	13.0%	14.1%	13.0%	34.8%	25.0%
Economic order quantity leads to improved organizational performance	11	11	13	26	31
	12.0%	12.0%	14.1%	28.3%	33.7%

Economic order quantity index

Economic order quantity index was generated from a 5-likert scale question that examined the rating of economic order quantity practice. The computation involving Nzoia Sugar Company Ltd for instance is shown in equation 4.1 where Nzoia Sugar Company Ltd had an index of 0.7111. All other sugar manufacturing firms in Kenya indices computed and captured as in Table 6.

$$IndexNzoia = \frac{(1\times1)+(2\times1)+(3\times2)+(4\times2)+(5\times3)}{5\times9} = \frac{32}{45} = 0.711 \ldots\ldots\ldots\ldots\ldots\ldots(4.2)$$

Table 6: Economic order quantity index

Name of the firm	SA	A	N	D	SD	Total	Index
Nzoia Sugar Company Ltd	3	2	2	1	1	9	0.7111
Transmara Sugar Company	2	2	1	0	1	6	0.7333
Sony Sugar	2	1	1	1	1	6	0.6666
Muhoroni Sugar Company	1	1	0	2	0	4	0.65
West Kenya Sugar Company Limited	2	1	0	1	1	5	0.68
Mumias Sugar Company	1	3	2	1	0	7	0.7142
Chemelil Sugar Factory	1	2	0	1	0	4	0.75
Kibos Sugar & Allied Industries	2	1	1	1	1	6	0.6666
Butali Sugar Mills	1	2	0	1	1	5	0.64
Sukari Industries Limited	1	2	2	1	2	8	0.575
Kwale International Sugar Company	2	2	1	1	2	8	0.625
Kisii Sugar Factory	0	2	0	1	0	3	0.6666
Busia Sugar Industry	0	1	0	2	1	4	0.45
Miwani Sugar Company Limited	1	1	1	0	1	4	0.65
Soin Sugar Company Limited	2	1	1	1	1	6	0.6666
West Valley Sugar	1	2	1	2	1	7	0.6
Overall Index	22	26	13	17	14	92	0.6543

Source: Study Data (2023)

From Table 6 results above the overall economic order quantity index was 0.6543 which lies between 0.6-0.79 which implied that economic order quantity practice was high in sugar manufacturing firms in Kenya.

Correlation analysis

The study evaluated the link between economic order quantity and organizational performance of sugar production enterprises in Kenya using the Pearson product moment correlation analysis. This correlation analysis provides insights into the magnitude and direction of the relationship between economic order quantity on organizational performance. The correlation values vary from -1 to +1. Two-tail test was used to test correlation coefficient at 95% significance level. Therefore, p values above 0.05 are deemed insignificant while those below 0.05 are deemed significant (Sekran, Bougie, & Roger, 2010). The results were as presented in Table 7.

Table 7: Correlation matrix

	EOQ	Y^0
EOQ	1	
Y^0	0.611*	1
	(0.010)	

Source: Study Data (2023)

The economic order quantity exhibited a strong and meaningful correlation with organizational success. This was demonstrated by a correlation coefficient of 0.611 and a p value of 0.010, which is statistically significant at the 0.05 level.

Model summary

The objective of this study was to examine the collective effect of economic order quantity on organizational performance of sugar producing enterprises in Kenya. The results of the model summary of the study are presented.

Table 8: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.785[a]	.616	.592	0.107	1.854

    a.   Predictors: (Constant), EOQ, JIT, ABC and VMI

    b.   Dependent Variable: Percentage Change in Profitability

Table 8 displays an R-square value of 0.616. This suggests that the inventory management practice accounts for 61.6% of the variations in profitability (organizational performance). Moreover, the findings indicate that 38.4% of the variability in profitability remains unaccounted for by economic order quantity. The R-value of 0.785 demonstrates a significant link between inventory management techniques and the organizational performance (namely, changes in profitability) of sugar producing enterprises in Kenya.

ANOVA

The analysis of variance (ANOVA) technique is employed to assess the variability among means across several groups. The outcomes of the ANOVA analysis for the study are presented in Table 9

Table 9: ANOVAa

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.356	4	.089	4.045	.001[b]
1	Residual	.242	11	.022		
	Total	.598	15			

a. Dependent Variable: Percentage change in Profitability

b. Predictors: (Constant), Economic Order Quantity

Source: Study Data (2023)

The table 9 above presents the correlation between economic order quantity and organizational performance, specifically changes in profitability, in sugar producing enterprises located in Kenya. The entire model demonstrates that economic order quantity have a significant impact on organizational performance, with a 95% confidence interval and a p-value of 0.001, which is less than 0.05. This is corroborated by the calculated f statistic value of 4.045, which surpasses the essential f value of 3.36.

Regression coefficients

Table 10 presents the regression coefficients of the independent variables, which provide insights into the effect of economic order quantity on organizational performance.

Table 10: Regression coefficients

Model		Unstandardized Coefficients		T	Sig.
		B	Std. Error		
1	(Constant)	.851	.249	3.412	.006
	Economic Order Quantity	.988	.236	4.193	.008

Source: Study Data (2023)

The following regression equation model was derived from regression coefficient Table 10 above.

Y = 0.851 + 0.988EOQ …………………………………………...…….(4.6)

Where:

Y- Organizational performance (percentage Change in Profitability)

EOQ- Economic order quantity proxied by economic order quantity index

According to the regression equation 4.5, the constant value of 0.851 is significant at 95% confidence interval indicated with a p-value of $0.006 < 0.05$. The constant value depicted that when sugar manufacturing firms in Kenya have not adopted economic order quantity, the percentage change in profitability (organizational performance) in sugar manufacturing firms will be at rate of 0.851%.

The objective of the study was to examine the effect of economic order quantity on the organizational performance of sugar manufacturing companies in Kenya. The null hypothesis of the objective was economic order quantity has no significant effect on organizational performance of sugar manufacturing companies in Kenya. From regression results in Table 10 indicated that economic order quantity index had a regression coefficient of 0.988 and p-value of 0.008. The p-value was less than 0.05 and the regression coefficient was positive. This implied that economic order quantity index had a positive and significant effect on percentage change in profitability (organizational performance) of sugar manufacturing firms in Kenya. Therefore, the study rejected the null

hypothesis and concluded that economic order quantity has a positive and significant effect on the organizational performance of sugar manufacturing companies in Kenya.

These results mean that a unit increase in economic order quantity index leads to subsequent increase on percentage change in profitability of sugar manufacturing firms in Kenya by 0.988%. These study results are similar to Hussein and Makori (2018) whose study results indicated that inventory control in terms of Economic Order Quantity, positively and significantly influence the performance. These results were also consistent with Atieno and Bett (2019) whose study findings established that there is a positive and significant correlation between Economic order quantity and organization performance of steel manufacturing companies. These study findings were also in like with Lwiki, Ojera, Mugenda and Wachira (2018) whose study results indicated that there is a positive correlation between Economic Order quantity financial performances.

IV. Conclusion

From the descriptive statistics majority of the respondents agreed that economic order quantity adoption improves organizational performance of sugar manufacturing firms in Kenya through minimizes stock holding costs, minimizes obsolete stock, guaranteeing high accuracy by focusing on demand and reducing stock ordering costs. The inferential statistics shows a regression coefficient of 0.988 and p value of 0.008 implying that economic order quantity adoption had a positive and significant effect on organizational performance of sugar manufacturing firms in Kenya.

V. Recommendations

From the descriptive statistics majority of the respondents agreed that economic order quantity does not guarantees high accuracy by focusing on demand. Firms are therefore recommended to train procurement officers who will be able to adopt economic order quantity effectively in order to guarantee high accuracy by focusing on demand from the customers.

It was also established that from the descriptive statistics, some of the sugar manufacturing firms had not effectively and efficiently adopted economic order quantity. It is therefore recommended that management of sugar firms should fully adopt economic order quantity. This will help firms in determining the optimum size of stock to be hold and the right time to order inventory. Therefore, the firm will be able to reduce frequent ordering thus also reducing ordering cost. Holding optimum stock level will also help firms to reduce cost of holding stocks.

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