INVENTORY MANAGEMENT PRACTICES AND OPERATIONAL PERFORMANCE OF KENYA ANIMAL FEEDS INDUSTRY

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ABSTRACT

In the 21st century, businesses face high competition and volatility and must cope with changing quality standards and levels. Efficiency and effectiveness are crucial to success, and companies must deal with rising handling and operational costs. Many companies have implemented inventory management practices to address these challenges, which help optimize operations and reduce resource wastage, especially in inventory handling. Inventory management is particularly important in the animal feed industry, where inventory handling makes up 80% of all operations, and 90% of core activities involve inventory handling. Therefore, a study was conducted on 24 animal feed-producing companies to determine the impact of inventory management practices on operational performance. Data was collected using a questionnaire and study guide and analyzed using descriptive statistics and regression. The study shows a significant correlation between operational performance and EOQ (p = 0.003), JIT (p = 0.05), and MRP (p = 0.04). However, the study had some limitations, including focusing only on four inventory management practices, despite a large pool of available practices and excluding the entire supply chain from consideration. Therefore, the study recommends further research into a wider range of inventory management practices and including the entire supply chain in future studies.

Keywords: Inventory management practices, Operational performance, Kenya, Animal feed-producing companies, Impact

INTRODUCTION

Inventory management is critical in manufacturing or production, especially for the animal feed industry. Effective inventory management practices can significantly enhance operational efficiency, reduce costs, and improve customer satisfaction (Aggarwal & Ranganathan, 2019; Omondi, 2019; Zheng et al., 2020). Given the highly competitive business environment, effective inventory management can be the key to a company's profitability and competitiveness (Oshchepkov et al., 2019; Caprarulo et al., 2022). In Europe and Asia, animal feed manufacturing companies have already developed advanced inventory management systems that enable them to monitor inventory levels in real-time, track sales trends, and optimize production schedules (Boienko & Susidenko, 2019; Piñeiro, 2022; Puente-Rodríguez et al., 2022). These sophisticated systems are often supported by state-of-the-art software programs that provide real-time inventory levels, demand forecasts, and production capacity data.

However, the animal feed industry in Africa, including Kenya, is still in its early stages of development. Many companies in this sector face several operational challenges, such as inadequate infrastructure, low technology adoption levels, and limited access to financing (Termeer et al., 2019; Dell et al., 2022). Consequently, most companies in the animal feed industry in Kenya struggle with inventory management and often suffer from stockouts, overstocks, and other inventory-related issues (Vernooij et al., 2019; Nattassha et al., 2020). Kenya is an intriguing area for studying inventory management practices in the animal feed industry. The country's thriving agricultural sector and rapidly growing population have fueled the demand for animal feed (Boienko & Susidenko, 2019; Zdorovets et al., 2020). However, Kenya's animal feed industry has challenges, including high production costs, limited access to raw materials, and a fragmented distribution network (Negash, 2020). Despite the importance of inventory management practices in the animal feed industry, there needs to be a greater understanding of how these practices impact the operational performance of animal feed-producing companies in Kenya.

Therefore, the study aimed to establish the impact of inventory management practices on the operational performance of animal feed-producing companies in Kenya. The study focused on several aspects of inventory management, including Economic Order Quantity, Just-In-Time, Material Requirement Planning, and Vendor Management Inventory. The research also considered the impact of these practices on various operational performance indicators, such as production efficiency, customer satisfaction, and financial performance. The findings of this study could have significant implications for animal feed-producing companies in Kenya and other developing countries. By identifying the best inventory management practices for the animal feed industry, companies could significantly enhance their operational efficiency, reduce costs, and improve customer satisfaction. Moreover, the results of this study could also inform policymakers and investors about the potential benefits of supporting the development of the animal feed industry in Kenya and other developing countries.

Research Problem

While advanced inventory management systems and software are widely used in the animal feed industry in Europe and Asia, companies in Kenya and other developing countries face several challenges, such as inadequate infrastructure, low technology adoption levels, and limited access to financing. These challenges often lead to stockouts, overstocks, and other inventory-related issues, negatively impacting operational efficiency, customer satisfaction, and financial performance. Therefore, the study attempted to investigate the impact of inventory management practices, including Economic Order Quantity, Just-In-Time, Material Requirement Planning, and Vendor Management Inventory, on various operational performance indicators of animal feed-producing companies in Kenya. The findings of this study could provide valuable insights for companies, policymakers, and investors and contribute to the development of the animal feed industry in Kenya and other developing countries.

Purpose of the Study

To investigate how inventory management practices such as Economic Order Quantity, Just-In-Time, Material Requirement Planning, and Vendor Management Inventory affect the operational performance of animal feed-producing companies in Kenya.

Research Objective

To establish the impact of inventory management practices on the operational performance of animal feed-producing companies in Kenya.

Research Question

How do inventory management practices impact the operational performance of animal feed-producing companies in Kenya?

Value of the Research

The research conducted on inventory management practices and operational performance of Kenya's animal feeds industry is significant in several ways. Firstly, it provides valuable insights into the current state of inventory management practices in the animal feed industry in Kenya. Industry stakeholders can use this information to identify areas where improvements can be made to enhance the efficiency and effectiveness of inventory management.

Secondly, the research sheds light on the relationship between inventory management practices and operational performance in the animal feed industry. The study shows a positive correlation between effective inventory management practices and operational performance by analyzing data from a sample of companies in the industry. Industry players can use this finding to develop strategies to improve operational performance by optimizing inventory management practices.

Moreover, the research provides a benchmark for the animal feed industry in Kenya, which can be used to compare the performance of individual companies against industry-wide standards. This benchmarking can help identify best practices in inventory management and operational performance, enabling companies to learn from each other and improve their performance.

Conceptual Framework

The independent variable is Inventory Management Practices, which includes four key practices: Economic Order Quantity, Just-In-Time, Material Requirement Planning, and Vendor Management Inventory. The dependent variable is Operational Performance, which has three key indicators: Cost of Goods Sold, Inventory Turnover, and Customer Satisfaction. The framework suggests that Inventory Management Practices directly impact Operational Performance. Economic Order Quantity helps companies determine the optimal amount of inventory to order, thereby reducing costs and improving profitability. Just-In-Time involves the timely delivery of materials, reducing inventory holding costs, and increasing efficiency. Material Requirement Planning involves determining the right amount of raw materials to order, reducing waste, and improving efficiency. Vendor Management Inventory involves working closely with suppliers to manage inventory levels, reducing inventory carrying costs, and improving efficiency.

The three indicators of Operational Performance measure the impact of Inventory Management Practices on the company's bottom line. Cost of Goods Sold measures the cost of producing and selling a product, with lower costs indicating greater efficiency. Inventory Turnover measures how often inventory is sold and replaced, with higher turnover indicating greater efficiency. Customer Satisfaction measures customers' satisfaction with the company's

products, indicating the impact of Inventory Management Practices on overall customer experience, as shown in Figure 1 below.
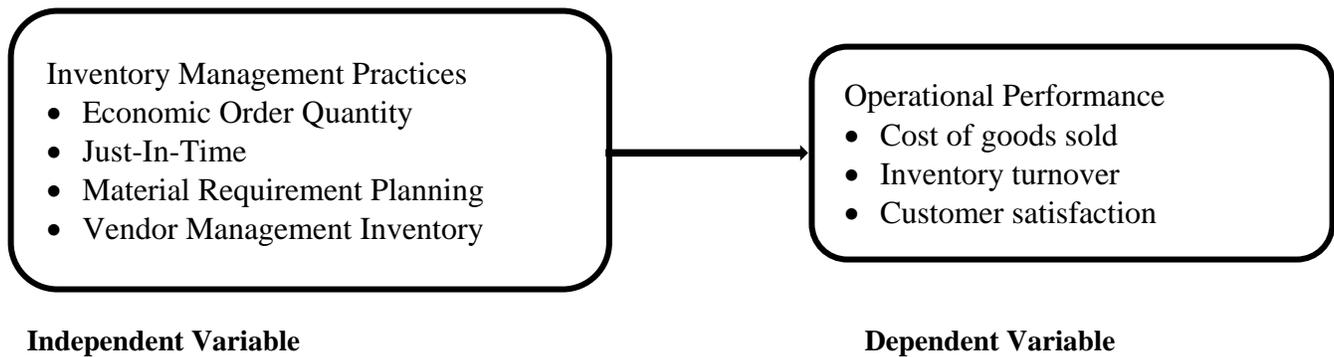

Inventory Management Practices	Operational Performance
• Economic Order Quantity	• Cost of goods sold
• Just-In-Time	• Inventory turnover
• Material Requirement Planning	• Customer satisfaction
• Vendor Management Inventory	

Independent Variable   **Dependent Variable**

Figure 1: The Relationship between the Inventory Management Practices and Operational Performance

METHODOLOGY

Study Population and Sample Size

The inventory management practices of animal feed producers in Kenya were studied by selecting a sample of 24 animal feed manufacturing companies out of 79 that produce animal feed for various animals, such as poultry, cattle, pigs, and fish. The sample size was chosen based on feasibility and available resources, and it was representative of the population, providing sufficient data to draw meaningful conclusions. Simple random sampling was employed to ensure that each participant had an equal chance of being selected from the population's list of all animal feed manufacturing companies. The research design employed was descriptive, aiming to describe the inventory management practices of animal feed manufacturers.

Data Collection

A structured questionnaire was used to collect data for the study. The questionnaire gathered information about companies' inventory management practices in Kenya's animal feed industry. It consisted of open-ended and closed-ended questions, allowing for various responses and ensuring that all relevant information was captured (Aggarwal & Ranganathan, 2019). Face validity was checked to ensure that the questions were appropriate for the study and that they would elicit the desired information from the respondents (Kaihlanen et al., 2019). The counter-checking involved reviewing the questionnaire to ensure it was clear, relevant, and easy to understand. The questionnaire was administered to a sample of companies in the animal feed industry in Kenya.

Data Analysis

The study's specific objective was to establish the impact of four key inventory management practices: Economic Order Quantity, Just-In-Time, Material Requirement Planning, and Vendor Management Inventory on operational performance. The variables were measured on a Likert scale, a commonly used method of measuring attitudes and perceptions. The Likert scale assigns numerical values to responses ranging from strongly agree to disagree strongly. The data collected was analyzed using inferential statistics, specifically regression analysis.

Regression analysis is a statistical method used to determine the relationship between a dependent variable and one or more independent variables. This study's dependent variable was operational performance, while the independent variables were the four inventory management practices. Equation 1 shows the regression model used in the study.

$$Y = W_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Y represents the operational performance of animal feed-producing companies, and X_1, X_2, X_3, and X_4 represent Economic Order Quantity, Just-In-Time, Material Requirement Planning, and Vendor Management Inventory, respectively. The intercept (W_0) represents the constant, while β_1 to β_4 represent the coefficients of variables X_1 to X_4. Therefore, it was expected that the impact of inventory management practices on the operational performance of animal feed-producing companies in Kenya would be established.

RESULTS AND DISCUSSION

Questionnaire Return Rate

Out of the 24 questionnaires distributed, only 23 were returned, resulting in a response rate of 95%. This rate is considered excellent and allows for feasible conclusions to be drawn. According to Kaihlanen et al. (2019), a response rate of 80% or higher is considered excellent, while rates ranging from 70%-79% are rated as very good, 60%-69% as good, and 50%-59% as adequate. The study's appendix I lists the 23 respondents from the Kenya Animal Feeds Industry who met the study's criteria for good feedback.

Impact of Inventory Management Practices

Inventory management is a critical aspect of any business that deals with physical products. Proper inventory management can positively impact a company's profitability, cash flow, and customer satisfaction. Therefore, understanding the impact of inventory management practices is crucial for companies to optimize their inventory levels and improve their bottom line. In this context, descriptive statistics, such as means and standard deviation, provided valuable insights into the characteristics of inventory management practices. However, to assess the impact of these practices, inferential statistics, such as regression analysis, was used to analyze the relationship between inventory management practices and key business metrics. The study explored the impact of inventory management practices using descriptive and inferential statistics, shedding light on the importance of effective inventory management for businesses.

Involvement of Inventory Management Practices in Operational Performance

The study's second objective focused on evaluating the impact of inventory management practices on animal feed manufacturers' operational performance. The researchers converted the objective variables into statements and asked participants to rate their agreement using a Likert scale of 1 to 5. The scale included options for "very great extent," "great extent," "moderate extent," "little extent," and "no extent," which corresponded to numerical values of 5, 4, 3, 2, and 1, respectively. Table 1 presents the means and standard deviation of the participants' ratings.

Table 1

Involvement of Inventory Management Practices in Operational Performance

Variable Linkage	N	Sum	Mean	Std. Deviation
Ordering of raw materials from suppliers and stores replenishment is based on optimal ordering quantity policies	23	105.00	4.57	0.73
Order of manufacturing materials at the factory level and store requirements from factory packing is based on clients' requirement mix	23	100.00	4.35	0.65
Stores and clients receive their orders within the time specified in the order sheet	23	98.00	4.26	0.62
There are systems put in place to ensure dedicated, proper, prioritized, and timely integrated communication systems with suppliers	23	94.00	4.09	1.00

Based on the given information, inventory management practices significantly impact operational performance. Among the different aspects of inventory management, ordering material from suppliers and store replenishment based on optimal ordering quantity policies received the highest mean score of 4.57, indicating that this is an area where the company is performing well. Ordering of manufacturing materials at the factory level and store requirements from factory packing based on clients' requirement mix received a mean score of 4.26, indicating that this area also positively impacts operational performance. Responses for the third statement, indicating that stores and clients receive their orders within the time specified in the order sheet, had a mean score of 4.26, suggesting that the company is meeting its delivery commitments. Finally, the responses on whether systems are implemented to ensure reliable, proper, prioritized, and timely communication integrated with suppliers received a mean score of 4.08, indicating room for improvement.

Inventory Indicators

Table 2 presents information on inventory indicators and key metrics businesses use to manage their inventory effectively. The indicators are measured based on four variables: better production schedules, vendor relationships, inventory costs, and inventory management practices. The Table provides each indicator's variable linkage, sample size (N), sum, mean, and standard deviation.

Table 2

Inventory Indicators

Variable Linkage	N	Sum	Mean	Std. Deviation
Better production schedules, enough components available for manufacturing, and better sales plans	23	103.00	4.48	0.79
Better relationship with vendors, quality supplies on competitive and integrated vendor management system	23	101.00	4.39	0.84
Minimum storage and shortage costs and low variable inventory costs	23	101.00	4.39	0.84
Minimum (deliberate) inventory, zero defects, 100% on-time delivery, and viewing huge inventory rather as a liability than asset-wise	23	98.00	4.26	0.96

The research findings indicate that the industry has shown improvements in production schedules and availability of components for manufacturing, resulting in better sales plans. The mean value of this improvement is 4.48, with a standard deviation of 0.79. Moreover, the study reveals that the industry has established a better relationship with vendors, which has led to quality supplies. The relationship is evident from using a competitive and integrated vendor management system with a mean score of 4.30 and a standard deviation of 0.84. The research also shows that the industry has minimized storage and shortage costs and variable inventory costs. The mean score for this is 4.39, with a standard deviation of 0.84. Furthermore, the responses on minimum inventory levels, zero defects, 100% on-time delivery, and viewing huge inventory as a liability rather than an asset indicate a mean of 4.26 with a standard deviation of 0.96. These findings suggest that positive inventory management practices have contributed to these indicators. Table 3 shows the inferential analysis.

Table 3

Inferential Analysis

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
0.86	0.75	0.53	0.40	0.75	1.80	4.0	18.0	0.16

A 0.864 correlation value was discovered, showing that inventory management practices (independent variables) strongly correlate with operational performance (dependent variable). The coefficient of determination was also 0.746, indicating that the regression line could account for 74.6% of the total observations. The finding suggests that inventory management practices have a significant impact on the operational performance of a company. It is important to note that effective inventory management can improve a company's bottom line by reducing costs and increasing revenue. Companies prioritizing inventory management practices will likely experience better operational performance and greater success. The results of ANOVA are shown in Table 4.

Table 4

ANOVA

	Sum of Squares	df.	Mean Square	F	Sig.
Regression	4.24	4.0	1.06	1.19	0.001a
Residual	37.51	18.0	0.89		
Total	41.75	22.0			

The statistical method of ANOVA was employed to determine the importance of implementing the regression model. The findings reveal an *F*-significance score of $p < 0.001$. This score demonstrates that the regression model is extremely efficient in producing accurate outcomes, showing a probability of only 0.001 of generating erroneous predictions (Table 5).

Table 5

Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
	B	Std. Error	*B*		
(Constant)	1.19	1.37		0.87	0.000
Economic Order Quantity	0.12	0.18	0.11	0.68	0.003
Just-In-Time	0. 21	0.18	0.02	0.15	0.046
Material Requirement Planning	0.43	0.27	0.25	1.46	0.041
Vendor Management Inventory	0.37	0.25	0.26	1.60	0.057

A regression model was established as shown in Equation 2:

$$Y = 1.19 + 0.12X_1 + 0.21X_2 + 0.43X_3 + 0.37X_4 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The results of regression analysis show that several variables can predict the performance of operations in a company. The model suggests that if all variables were zero, the performance would be 1.19. However, increasing Economic Order Quantity (EOQ) by one unit would increase 0.12 performance. Similarly, an increase in Just-In-Time (JIT) by one unit would lead to a 0.21 increase in performance, while an increase in Material Requirement Planning (MRP) by one unit would increase to 0.43. Finally, an increase in Vendor Management Inventory (VMI) by one unit would lead to a 0.37 increase in performance. These findings suggest that implementing JIT, EOQ, MRP, and VMI in a company can improve operational performance at varying rates. Furthermore, the study shows a significant correlation between operational performance and EOQ ($p = 0.003$), JIT ($p=0.05$), and MRP ($p=0.04$).

CONCLUSIONS AND IMPLICATIONS

The study provides valuable insights into the impact of inventory management practices on business performance. The findings indicate that effective inventory management can positively impact a company's profitability, cash flow, and customer satisfaction. Using descriptive statistics, such as means and standard deviation, and inferential statistics, such as regression analysis, provided valuable insights into the characteristics of inventory management practices and the relationship between inventory management practices and key business metrics. The study also highlights the importance of proper inventory management, which can significantly impact operational performance. The results show that ordering material from suppliers and store replenishment based on optimal ordering quantity policies, ordering of manufacturing materials at the factory level and store requirements from factory packing based on clients' requirement mix, and stores and clients receiving their orders within the time specified in the order sheet have a positive impact on operational performance. The study also reveals that the industry has improved production schedules and availability of components for manufacturing, better vendor relationships, minimized storage and shortage costs, and variable inventory costs. The findings suggest that positive inventory management practices have contributed to these indicators. Overall, the study highlights the importance of effective inventory management in optimizing inventory levels and improving business performance.

Limitations and Future Research

The following limitations and areas for further research were established based on the study's findings.

Limitations

The study has certain limitations that need to be considered while interpreting the results:

- One of the limitations is the small sample size of only 23 participants from one industry. The generalization of the study results to other industries or larger samples may be limited;
- Another limitation is the reliance on self-reported data, which may be subject to social desirability bias;
- Additionally, the study only used quantitative data, limiting understanding of the qualitative aspects of inventory management practices.

Future Research

- Further research can explore the qualitative aspects of inventory management practices, such as the factors influencing the implementation of these practices, the challenges faced by businesses in implementing effective inventory management practices, and the impact of organizational culture on inventory management practices;
- Future research can also investigate the relationship between inventory management practices and other key business metrics, such as return on investment and customer loyalty;
- Moreover, conducting a comparative study of inventory management practices across different industries and countries can provide a broader understanding of the best practices that can be applied to different business contexts;

- Finally, future research can also examine the role of technology in improving inventory management practices, such as using automation, artificial intelligence, and machine learning to optimize inventory levels and reduce costs.

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