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LEAN INVENTORY MANAGEMENT AND PERFORMANCE OF MILK PROCESSORS IN KENYA

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ABSTRACT: *Dairy is a key contributor to the Kenyan economy and it helps in poverty alleviation and food nutrition in rural and urban areas. Dairy processing acts as a link between dairy farmers and the consumers in Kenya. However, milk processors have been facing numerous challenges that consequently affect their performance. Poor quality of milk, post-harvest losses resulting from inadequate cooling plants and seasonality of milk production in the country are among the problems the milk processors face. Raw milk, the main inventory for milk processors, is highly perishable and requires processing immediately after collection. However, this has not been the case. In fact, 54% of the invested capacities of milk processors remain underutilized. This calls for leanness in inventory that will ultimately reduce waste and improve firms' performance through reduced complaints. This study was guided by resource orchestration and lean theory. The study was a census and the unit of analysis was all milk processors in Kenya licensed by the Kenya Dairy Board. A pilot study was conducted to enhance the questionnaire's quality. A Cronbach Alpha of 0.8 was used. Before the regression was run, diagnostic tests were conducted to check for assumptions of linearity. An analysis of variance was conducted to test the variables' significance and, ultimately, a multiple regression analysis was run. Maintain zero inventory and use of technology to order inventory and maintain zero inventory had positive and significant coefficients while collaboration with suppliers and members in a supply chain had a negative insignificant coefficient. The study concludes that zero inventory and use of technology to order have significant positive correlation coefficients. This implies that the two can help a firm reduce customer complaints and in return improve performance.*

KEYWORDS: Lean, inventory management, dairy processors, milk, firms, performance.

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INTRODUCTION

The dairy sector plays a critical role in poverty alleviation and malnutrition in rural and urban areas of Kenya through increased household income and a consistent supply of milk products (KAM, 2018; Joto & Odock, 2019). The dairy processing industry which acts as a link between the dairy farmers and the consumers in Kenya is dominated by 4 major players (New KCC, Sameer, Githunguri, and Brookside). The industry has been turbulent. Consolidation of firms have resulted in mergers and acquisitions (Brookside acquired spin knit, Buzeki, Delamere, and Ilara firms) and now there are about 36 milk processors in Kenya (Kibogy, 2019). Milk processors purchase raw milk and help in the delivery of value-added products (yoghurt, ghee, milk powder and cheese) to the end consumers.

Milk processing and marketing help in the growth and development of the dairy industry. However, numerous challenges face milk processors in Kenya. Seasonality in milk production is one major problem prevalent in Kenya. Kenya has been the largest dairy producer in sub-Saharan Africa but, recently, the country has been facing a continuous decline in milk production and processing, making her 3rd in position from Ethiopia and Tanzania (Ibrahim, Akylo & Kanuya, 2018). Secondly, there has been a consistent problem regarding the quality of milk supplied by the dairy farmers. Dairy farmers deliver the milk to the dairy processors in most cases. This is as a result of lack of collection facilities in most rural areas in Kenya. Milk is a highly perishable commodity that requires boiling or processing immediately after collection. If the milk is not processed, most of the milk inventory is lost through deterioration (FA0, 2020). In addition, disruptions in the supply of inventory result in customer dissatisfaction as the delivery of quality services is not maintained (Abdul, 2018).

To round up the problems facing the dairy industry in Kenya is the inadequate capacity utilization prevalent in the country. Milk processors have invested in heavy value-adding machinery that remains idle to about 54% per annum. The low-capacity utilization is a problem as the demand for processed milk products is expected to grow with over 20% in the next 5 years (FAO, 2020). If the demand stretches more than the supply, milk processors will arguably face performance decline. There has been a reported 6.7% decline in the performance of the dairy industry in 2019 (Kenya Dairy Board (KDB), 2020).

A competitive dairy processing sector ought to provide affordable products that are easily accessible in the market. Therefore, dairy processing firms must recognize the role of lean inventory management in improving performance. Seefried (2014) postulates that lean focuses on waste elimination. Waste is something and anything that does not add value to the customer; thus, the customer is not willing to pay for it. Waste is commonplace in the dairy industry (Gupta, Singh & Kumar, 2012). Milk, the main input and inventory for milk processors, is prone to deterioration. Inventories determine long term competitive advantage to a firm and also, if not managed well, poor performance can be faced. This is because inventory levels in a firm determine quality, price and capacity (Abdul, 2018). Lean inventory management is therefore considered a critical aspect in the development of the agricultural dairy industry to meet the demand of dairy products globally (Muhammad, Akhter & Ullar, 2014).

Lean practices in the dairy sector entails the effective management of a supply-side, which is mainly characterized by the need for raw materials inventory. Lean inventory management in a dairy firm will translate to the efficient ordering and transportation of milk, which is a perishable product; thus, the firm will not have excess obsolete stock and will reduce wastes

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(Atnafu & Balda, 2018). This practice brings about better firm performance (Atnafu and Balda, 2018) through better capacity utilization (Lokuruka, 2016). Lean focuses on the customer; therefore, when a firm is lean, non-value-added activities are reduced. When adopted, lean improves a firm performance (Abdul, 2018).

Despite the benefits that leanness offers in a firm in terms of value generation, improving products and cost saving low adoption is seen in the dairy industry. To the best of the author's knowledge, no study has been done on leanness in milk processors in Kenya. Therefore, this study seeks to bridge this gap by looking into lean inventory management practices and performance of milk processors in Kenya.

RELATED WORKS

The study is anchored on two theories: resource orchestration and lean theory. The integration of resource management with asset orchestration develops the resource orchestration theory. Through asset orchestration actions that structure through identification, bundle through investment and leverage through deployment of resources in an organization are emphasized. The structuring, bundling and leveraging is done to create customer value and improve performance. The theory assumes that assets and resources alone cannot benefit a firm, but the decisions and actions of managers regarding the use of resources can create value and competitive advantages (Boss, 2014).

The resources of a firm such as knowledge, skills, and information are owned externally by suppliers or internally owned by the organization. The autonomous self-operating suppliers who own the resources need orchestration into more exceptional forms (Wong, Wong C. & Boon-itt, 2018). It is through this orchestration that a shared vision for the whole organization is established and, thus, better performance through productive opportunities and growth (Sikolia & Muthini, 2019).

Suppliers help make a firm lean as better supplier relationship means zero buffer stock. When in a better supplier relationship, a firm can obtain supplies as and when need be, at the right place. This will consequently reduce wastages and losses (Seefried, 2012; Abdul, 2018).

The proponents of the lean theory, Atnafu and Balda (2018), and Kimani (2018) postulate that lean theory extends the thought of Just in Time. The lean theory aims at reducing buffer stock and minimizing waste in firms (Atnafu & Balda, 2018). The theory provides insights into how manufacturers gain flexibility in their ordering decisions, reducing inventory stocks, and eliminating inventory costs (Kimani, 2018). The lean theory lends itself perfectly to the study so as to establish how milk processors develop ordering capabilities of raw milk that is highly perishable and prone to wastage and spoilage.

A lot of studies have been conducted in the area of lean inventory management and how it impacts on performance. Firms implement lean techniques in inventory management to reduce costs, improve flexibility, and have better focus time on customers. Lean inventory practice helps enhance firm profitability and efficiency as the firm seeks to reduce waste and increase inventory. A study by Krar (2020) concluded that being lean involves having inventory as close to zero as possible. Further, being lean concerns doing things cheaply while providing superior quality service.

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A study by Green (2018) found out that lean inventory management leads to a reduction in costs and lead times and increases on-time deliveries. The study by Green, (2018) argued that firms are making their suppliers leaner since inventory leanness by a firm can affect the leanness of suppliers. Therefore, higher productivity can be achieved if the buying organization works well with suppliers. A study by Ahmed, Midibbo, Modu and Muhammad (2016) incorporated JIT which is a major characteristic of inventory leanness. According to the study, JIT helps to obtain commodities as and when they are required. The practice of JIT helps to reduce non-value-added costs and long-run costs. A study by Achuora and Arasa (2020), on supermarkets in Kenya, found a positive relationship between lean inventory management and firm performance. Lean practices such as JIT, back-ordering, and drop shipping help improve capacity utilization and, therefore, improve operational performance. A study by Achuora and Arasa (2020) concluded that for JIT and inventory leanness to work, the procured materials should be of high quality to reduce defects and wastes. Leanness in inventory helps to improve profitability, reduce production cost and time in organizations (Odhiambo & Kihara, 2018).

As evidenced above, less has been done in the area of the dairy chain, specifically on milk processors. Therefore, this study seeks to bridge this gap by looking into lean inventory management and whether it leads to improved performance.

RESEARCH METHODOLOGY

The study adopted a descriptive research design since it described supply chain management practices present in milk processing firms in Kenya. A quantitative research approach was used. A quantitative approach is used when there is a lack of adequate research on a particular topic since it is used to establish relationships between variables and outcomes (Rutberg & Bouikidis, 2018). The study population was a census and constituted all 35 milk processors in Kenya. The unit of analysis was all milk processing firms licensed by the KDB. The study involved a census; hence, there was no sampling nor a sample frame. The study used primary data collected through the use of questionnaires. Before data collection, a pilot study was conducted at Superior Highland Dairy in Embu and Zawadi Dairy to enhance the quality of the questionnaire. Validity was through the help of supervisors using face content validity. Reliability was tested through test-retest reliability. A pilot study of 10 respondents from 2 firms, together with an expert's considerations, was used to test the questionnaire's reliability. The Cronbach Alpha coefficient was used to measure the consistency of variables where a threshold of 0.8, which is closer to 1, was set. A total of 35 questionnaires were distributed to all the 35 KDB licensed milk processors in Kenya. Among the 35, the dully filled questionnaires were 34.

Quantitative data was classified according to similar characteristics and then fed into a computer for presentation using Statistical Packaging for Social Sciences (SPSS version 25). The study utilized a multiple regression equation. All assumptions of linear regression were tested: multicollinearity, autocorrelation, and heteroscedasticity.

The multiple regression equation adopted was:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon$$

where:

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Y is Firm performance; β_0 is constant; β is slope; $x1$ is zero inventory; $x2$ is use of technology in ordering; $x3$ is supplier collaboration; ε is Error Term

RESULTS

Response Rate

A total of 35 questionnaires were distributed to all the 35 KDB licensed milk processors in Kenya. Among the 35, the duly filled questionnaires were 34, which is a response rate of 94.3%.

Table 1: Response Rate of Respondents

Response	**Frequency**	**Percentage**
Actual response	34	94.3%
Non response	1	5.7 %
Total	**35**	**100%**

Pilot Study

The Cronbach's alpha was computed based on average inter-correlations between variables. Cronbach is the most used coefficient of internal consistency and stability (Nzovila, 2019). According to Nzovila (2019), the rule of thumb for Cronbach alpha is that the closer it is to 1, the higher the reliability. The reliability results establish that all study variables were reliable.

Table 2: Reliability Results

Variable	**No of items**	**Alpha**	**comment**
Lean Inventory Management	9	0.917	Reliable

Background Information of the Respondents

This section presents the details of the milk processor companies in Kenya. The study sought to establish the number of years the companies have been operational. The location of the company's suppliers' and customers are also included in this section**.** The section also incorporates the turnover and milk volume handled annually by milk processors.

Period for Which the Company Has Been Operational

The study sought to establish how long the firms have been operational. The respondents were requested to indicate the number of years they have been operational.

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Table 3: Years of Operation

Age	Frequency	Percent (%)	Cumulative percent (%)
Less than 5 years	2	6.1	6.1
Between 5 and 10 years	2	6.1	12.2
Between 10 and 20 years	17	51.5	63.7
More than 20 years	12	36.3	100

The findings from Table 3 indicate that 6.1% of the milk processors in Kenya have been operational for a period of less than 5 years. 6.1% of the Kenyan milk processors indicated that they have been operational for a period between 5 and 10 years. Most of the milk processors have been operational for a period between 10 and 20 years and they represent 51.5%. 36.3% of the milk processors in Kenya have been in existence for more than 20 years. The findings show that firms have been operational for both a longer and shorter period of years.

Locality of Customers

The study sought to establish the outreach of milk processors products to their customers. The respondents were required to indicate the locality of the customers they serve.

Table 4: Locality of Customers

Place	Frequency	Percentage	Cumulative percentage
Specific towns	1	3	3
Specific regions	1	3	6
National	29	87.9	93.9
International	2	6.1	100

According to the findings in Table 4, 3% of the milk processors sell their products to specific towns, 3% of the milk processors reach customers in specific regions and 87.9% of the milk processors

reach out the national market. From the study, 6.1% of the milk processors sell their products in the international market. The findings show that milk processors sell to a wider group of customers ranging from local to international.

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Locality of Suppliers

The study sought to establish the location of milk processors' suppliers. The respondents were required to indicate the location of their suppliers.

Table 5: Locality of Suppliers

Place	Frequency	Percentage	Cumulative %
Specific towns	2	6.1	6.1
Specific regions	26	78.8	84.9
National	3	9.1	94
International	2	6.1	100

According to Table 5, 6.1% of the milk processors receive milk from suppliers located in specific towns while 78.8% of the milk processors in Kenya receive milk from specific regions. Milk processors that receive milk from national suppliers are represented by 9.1%; 6.1% of the milk processors receive their milk supplies from international suppliers. It is evident that milk processors in Kenya have varied sources of supply.

Annual Turnover of Milk Processors in Kenya

The study sought to establish the annual profitability of milk processors in Kenya. The respondents were required to indicate the amount of turnover they achieve annually.

Table 6: Turnover of Milk Processors

Turnover	Frequency	Percentage	Cumulative %
1,000,000 shillings	0	0	0
1,000,000–5,000,000 shillings	0	0	0
0ver 5,000,000 shillings	33	100	100

According to Table 6, all the 33 milk processors in Kenya have an annual turnover of over 5,000,000 million shillings.

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Annual Milk Volume Handled

The study sought to establish the amount of milk in liters the milk processors handle anually. The respondents were required to indicate the volume of milk they handle anually in liters.

Table 7: Annual Milk Volume

Milk Volume	Frequency	Percentage	Cumulative percentage
500,000 liters	**0**	**0**	**0**
1,000,000 liters	**1**	**3**	**3**
Over 1,000,000 liters	**32**	**97**	**100**

From the findings in Table 7, 3% of the milk processors in Kenya handle 1,000,000 liters of milk annually while 97% of the milk processors handle over 1,000,000 liters of milk annually.

Performance of Milk Processors in Kenya

This is the analysis of the dependent variable of the study to assess the status of performance of milk processors in Kenya. The results are as depicted in Table 8.

Table 8: Status of Performance of Milk Processors in Kenya

Statements	Very Great Extent	Great Extent	Moderate Extent	Little Extent	No Extent	Mean	Std.
Reduced Customer complaints	45.5%	30.3%	24.2%	0%	0%	4.21	.820

45.5% of the Kenyan milk processors agreed to a very great extent that they achieve reduced complaints from customers as a result of lean inventory management. (See Table 8.) It is evident that 30.3% of the milk processors in Kenya agreed to a great extent that they achieve reduced customer complaints as a result of lean inventory management. From the results in Table 8, it is evident that 24.2% of the Kenyan milk processors agreed that they achieve reduced complaints from customers as a result of lean inventory management. The mean indicates that most of the milk processors agreed to a great extent that they achieve reduced customer complaints as a result of lean inventory management. The findings are of the same school of thought with Kimani (2018) who argues that lean production principle reduces inventory costs, wastages and overall improves organization performance. Ogenu and Ikegwuru (2016) argue that the practice of lean inventory management, when undertaken properly, helps to improve

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customer satisfaction and loyalty. When a customer is happy, they are willing to spend on your commodity, resulting in better firm performance and reduced complaints (Atnafu & Balda, 2018).

Status of Lean Inventory Management Practices in Milk Processors in Kenya

This section presents the findings of lean inventory management, the independent variable of the study, which was to assess the effect of lean inventory management on the firm performance of milk processors in Kenya. The study sought to examine the extent to which the respondents agreed with the various statements regarding lean inventory management in their firms. The findings are presented in Table 11.

Table 11: Lean Inventory Management

Statements	Very Great Extent	Great Extent	Moderate Extent	Little Extent	No Extent	Mean	Std
Maintain zero inventory levels	54.5%	45.5%	0%	0%	0%	4.55	.506
Use technology to order commodities and maintain no inventory	57.6%	42.4%	0%	0%	0%	4.58	.502
Collaborate with suppliers and members' in a supply chain	54.5%	42.4%	3.03%	0%	0%	4.52	.566

According to Table 11, it is evident that milk processors maintain zero inventory at a very great extent, as shown by the mean (Mean = 4.55, Std = .506). Further milk processors agreed with the statement that they maintain zero inventory levels where 54.5% agreed to a very great extent while 42.4% agreed to a great extent. It is clear that milk processors use technology to order commodities and maintain no inventory as 39.4% and 18.2% agreed to a very great extent and a great extent respectively with the statement (Mean = 4.58, Std = .502). More so, it is evident that there is collaboration between milk processors, suppliers and members in a supply chain as 54.5% and 42.4% agree to a very great extent and great extent respectively with the statement (Mean = 4.52, Std = .566). The mean indicates that collaboration is done to a very great extent.

The results are in tandem with Ngugi (2020) who postulated that adoption of inventory management practices improve performance in organizations. Lean is the ultimate goal for every firm. Leanness is critical to the success of a firm in the current dynamic market. Lean inventory management is a critical issue in management that needs be looked at keenly (Agu, Anike, Ozioma & Nnate, 2016). By being lean and performing lean inventory management practices, organizations achieve cost reductions across the entire chain (Mulumba, 2016).

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Odhiambo and Kihara (2018) outlined that lean inventory management helps firms keep track of supplies as this enhances replenishments and reduces loss. The findings agree with Kimani (2018), who outlined that inventory leanness is a tool in inventory management that is highly adopted by warehousing organizations in Kenya as it enhances performance and helps a firm to exceed customer satisfaction (Mulandi & Ismail, 2019).

Correlation between Lean Inventory Management and Firm Performance

Correlation analysis was conducted to ascertain the strength of the relationship between lean inventory management and performance of milk processors in Kenya. Pearson correlation coefficient was used to determine the relationship strength. The results are presented in Table 12.

Table 12: Correlation between Lean Inventory Management and Firm Performance

	Reduced Complaints	Maintain zero inventory levels	Use technology to order commodities and maintain no	Collaborate with suppliers and members in a supply chain
Reduced customer Complaints	1			
Maintain zero inventory levels	.617** .000	1		
Use technology to order commodities and maintain zero Inventory	.529** .002	.817** .000	1	
Collaborate with Suppliers and members in a supply chain	.363* .038	.626** .000	.904** .000	**1**

** correlation is significant at 0.01 level (2- tailed)

*correlation is significant at 0.05 level(2-tailed)

There exists a significant positive relationship tested at 0.01 level between reduced complaints, zero inventory levels and use technology to order inventory and maintain zero inventory levels. A significant positive relationship tested at 0.05 levels of significance is reported between reduced customer complaints and collaboration with suppliers and members in a supply chain. Atnafu and Balda (2018) found out that higher inventory management practices help a firm to attain competitive advantage and further improve performance. They add that competitive advantage has a direct positive effect on organizational performance.

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Diagnostic Tests

Before the regression was run, diagnostic tests were performed to check the assumptions of linear regression. (See Table 13.) The variance inflation factors for all variables do not exceed the critical value of 10. This indicates the absence of multicollinearity (Gatimbu, Ogada, Budambula & Kariuki, 2018). The Breusch-Pagan indicates the absence of heteroscedasticity since the test statistic is insignificant for all the study variables (Williams, 2020).

Table 13: Diagnostic Tests

Assumption	Test	Zero Inventory	Technology for ordering	Collaboration
Multicollinearity	VIF	3.809	8.655	6.908
Heteroscedasticity	Breusch-Pagan	0.5975	0.5975	0.5975

Analysis of Variance (ANOVA)

Analysis of variance was conducted and the results are given in Table 14. ANOVA is used to determine the reliability of the model that is developed in examining the relationship between the variables of the study. The analysis of variance (ANOVA) results presented in Table 13 indicate an F-statistic of 6.475 and a P-value of 0.002. The significance value is less than 0.01. The significance value shows that the regression model is statistically significant in predicting lean inventory management and influencing firm performance. The study establishes therefore that maintaining zero inventory levels, using technology for ordering and maintaining zero inventory and collaboration with suppliers and members in a supply chain acceptable statistically are useful in predicting reduced customer complaints in a firm.

Table 14: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.F
Regression	8.631	3	2.877	6.475	.002[b]
Residual	12.884	29	.444		
Total	21.515	32			

The results in Table 15 give the regression coefficients that answered the proposed regression model equation shown below:

$$\boldsymbol{Y} = \mathrm{Q}\mathbf{0} + \mathrm{Q}_1\boldsymbol{X_1} + \mathrm{Q}_2\boldsymbol{X_2} + \mathrm{Q}_3\boldsymbol{X_3} + \mathrm{s}$$

By substituting the coefficients in the model,

$$\boldsymbol{Y} = \mathbf{0.644} + \mathbf{0.599}\boldsymbol{X_1} + \mathbf{0.435}\boldsymbol{X_2} - \mathbf{0.204}\boldsymbol{X_3}$$

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From the model and the results in Table 4.18, it is evident that reduced complaints are statistically insignificant. This is an implication that reduced complaints from customers cannot stand alone without other variables in the study.

It was noted that the coefficients of maintaining zero inventory and use of technology to order inventory and maintain zero inventory are positively related to firm performance and are statistically significant (P = 0.05). The study agrees with Odhiambo and Kihara (2018) who found out a positive and significant (.001) relationship between lean inventory management and performance.

Collaboration with suppliers and members in a supply chain has a negative insignificant relationship with reduced customer complaints. This can help answer the need for better strategic relationships between members in a dairy chain. Farmers in Kenya have complained of information asymmetry that results in reduced gains that make them prefer the informal channel. Better collaboration can reduce competition form the informal sector and enhance quality of inventories obtained by milk processors (Lokuruka, 2016).

Table 15: Regression Coefficients of the Study Variables

Model	Unstandardized Coefficients B	Standard Error	Standard Coefficients Beta	T	Significance
(Constant)	-.932	1.284	0	-.726	.475
Maintain zero inventory	1.538	.665	.949	2.312	.030
Use technology to order commodities and maintain zero inventory	.3.034	1.283	1.857	2.366	.027
Collaborate with suppliers and members in a supply chain	-.778	.968	-.537	-.804	.430

a. Dependent Variable: reduced complaints

b. Predictors: (Constant), zero inventory, use of technology to order and maintain zero inventory and collaboration with suppliers and members in a supply chain.

c. Significance level is at 5%

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CONCLUSIONS AND RECOMMENDATIONS

A significant relationship was reported in maintaining zero inventory and in the use of technology to order inventory and maintain zero inventory, an implication that zero inventory and use of technology cause changes in firms' performance through reduced customer complaints. The change is however seen when all other factors are held constant. This can be attributed to the ability to hold minimum stock by milk processors whereby they end up ordering on need basis. This is common in surge periods. More so, post-harvest losses experienced by farmers have led to their transition to modern ways of business operations. Technology is now a new norm. Milk processors were traditionally transactional, less open and engaged in minimal communication with the farmers. In most cases there existed middlemen who acted as a barrier to efficient trade between milk processors and farmers. Nowadays, open communication and collaboration is adamant. Milk processors are working in tandem with dairy farmers to enhance supply visibility and reduce wastages. Information is readily available in most company websites and there are various channels of communication established. Communication is a key ingredient of collaboration and thus should be upheld.

The study recommends that milk processors should create a policy of order on need basis so as to avoid surpluses that result in losses. There is a need to balance inventory held in firms. Milk processors should avoid investing their resources in capacities that are not fully utilized, and focus on a need basis. Too much stock holds up financial resources while too little results in stockouts. Therefore, milk processors should maintain adequate inventory to provide high quality commodities that will reduce customer complaints. In the advent of technology, milk processors should intensively use available technology to order and maintain inventory as this will improve performance. Minimum inventory levels need to be set by milk processors to avoid surpluses or shortages. Milk processors have been receiving raw quality milk that rarely make it to the processing plant. To avoid such situations, there is a need to establish procurement guidelines that will be followed by suppliers. Consequently, this will reduce waste in the entire value chain.

REFERENCES

Abdul, F. W. (2018). lean manufacturing implementation in inventory control as a repair process. *Jurnal Logistik Indonesia, 2*(1), 31-36.

Arasa, R. M., & Achuora, J. O. (2020). Strategic Inventory Management Practices and the Performance of Supermarkets in Nairobi County, Kenya. *European Journal of Business and Management Research*, *5*(2).

Agu, O. A., Obi-Anike, H. O., & Eke, C. N. (2016). Effect of inventory management on the organizational performance of the selected manufacturing firms. *Singaporean Journal of Business economics, and management Studies*, *5*(4), 56-69.

Ahmed, A. D., Modibbo, S., Modu, K., & Muhammad, B. (2016). Effect of inventory management on financial performance: Evidence from Nigerian conglomerate companies. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, *10*(9), 33-89.

Atnafu, D., & Balda, A. (2018). The impact of inventory management practice on firms' competitiveness and organizational performance: Empirical evidence from micro and small enterprises in Ethiopia. *Cogent Business & Management*, *5*(1), 1503219.

Gatimbu, K.K., Ogada, M.J., Budambula, N. and Kariuki, S., 2018. Environmental

Article DOI: 10.52589/JARMS-QHW5HYGM
DOI URL: https://doi.org/10.52589/JARMS-QHW5HYGM

sustainability and financial performance of the small-scale tea processors in Kenya. *Business Strategy and the Environment*, *27*(8), pp.1765-1771.

Green, K. (2018). The Contagion of Lean Inventory Management in the Supply Chain.

Gupta, S. K., Singh, R. V., & Kumar, R. (2012). Managing Inventory waste through Lean Tool: A case study. *International Journal on Emerging Technologies*, *3*(1), 4-17.

Ibrahim, A.W., Akyoo, A.M. and Kanuya, N.L., 2018. Analysis of marketing performance of the dairy value chain in Tanga city, Tanzania. *Tanzania Journal of Agricultural Sciences*, *17*(2).

Joto, B. M., & Odock, S. O. (2019). Effect of logistics Outsourcing on the Performance of Dairy Processing Firms in Kenya. Journal of Procurement & Supply Chain, 3(2), 17–35.

Kimani, L. G. (2018). Effect of Inventory Management Practices on Operational Performance of Kenya Power & Lighting Company Limited Doctoral dissertation, *University of Nairobi.*

Lokuruka, M.N., 2016. Overview of dairy processing and marketing in East African dairy value chains: Opportunities and challenges

Makau, E. K., & Ndeto, C. K. (2021). Effect of inventory management on supply chain performance in non-governmental organization in Somalia. *International Journal of Logistics and Procurement Management*, *3*(1).

Muhammad, Z., Akhter, S.N. and Ullah, M.K., 2014. Dairy supply chain management and critical an investigation on dairy informal channel partners in Pakistan. *IOSR Journal of Business and Management*, *16*(3), pp.81-87.

Mulandi, C. M., & Ismail, N. (2019). Effect of inventory management practices on performance of commercial state corporations in Kenya. *International Academic Journal of Procurement and Supply Chain Management*, *3*(1), 180-97.

Mulumba, A. (2016). *Inventory management practices and financial performance of manufacturing firms in Kenya: case of Agrochemical Firms* (Doctoral dissertation, Kca University).

Musau E., Namusonge, G., Makokha, EN, & Ngeno, N., (2017). *The Effect of Transport Management on Organizational Performance among Textile Manufacturing Firms in Kenya*

NGUGI, E. N. (2020). *Effects of inventory management systems on performance of manufacturing companies in Eldoret Town, Kenya* (Doctoral dissertation, Kisii University).

Nzovila, R. (2019). *End User Involvement and Supply Chain Performance in Kenyan Universities* (Doctoral dissertation, university of Embu).

Odhiambo, M. O., & Kihara, A. N. (2018). Effect of inventory management practices on supply chain performance of government health facilities in Kisumu county in Kenya. *Journal of International Business, Innovation and Strategic Management*, *2*(2), 145-166.

Sikolia, G.M. and Muthini, J.N., 2019. Influence of procurement ethics, professional training, and compliance with government regulations on procurement committee's performance in public secondary schools in Kenya: a case of Khwisero Sub County. *The Strategic Journal of Business & Change Management*, *6*(2), pp.1397-1416.

Sirmon, D. G., Hitt, M. A., Ireland, R. D., & Gilbert, B. A. (2011). Resource orchestration to create competitive advantage: Breadth, depth, and life cycle effects. Journal of Management, 37(5), 1390–1412.

Synthia, Seefried., September 17 2014. *Applying LEAN/Continuous Improvement Principles to Cash Management.*

Williams, R. (2019). The Development of Econometrics in Australia: 1930–2000. *History of*

Article DOI: 10.52589/JARMS-QHW5HYGM
DOI URL: https://doi.org/10.52589/JARMS-QHW5HYGM

Economics Review, *74*(1), 25-45.

Wong, C.W., Wong, C.Y. and Boon-itt, S., 2018. How does sustainable development of supply chains make firms lean, green and profitable? A resource orchestration perspective. *Business Strategy and the Environment*, *27*(3), pp.375-388.

Article DOI: 10.52589/JARMS-QHW5HYGM
DOI URL: https://doi.org/10.52589/JARMS-QHW5HYGM