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Abstract

The dairy industry in Tanzania has been experiencing a decline in performance characterized by reduced efficiency, low quality, and quantity as well as increased wastage. This study sought to investigate the influence of lean supply chain strategy on the performance of the dairy industry in the Southern Highlands in Tanzania. The study adopted the descriptive research design. The target population was employees working at the milk processing plant in Iringa Municipality. A total of 60 employees were targeted. A census of all the employees was conducted since the target population was small. Primary data was collected using structured questionnaires. Descriptive statistics including percentages and means were used to describe the data. Regression analysis was used to establish the relationship between the study variables. The results indicated that customer relationship strategy had a positive and significant effect on the performance of the dairy industry. Demand management strategy had a positive and significant effect on the performance of the dairy industry. Supplier relationship strategy had a positive and significant effect on the performance of the dairy industry. The study concluded that lean supply chain strategy significantly influences the performance of the dairy industry in the Iringa Region, Southern Highlands of Tanzania. The recommendations were that stakeholders in the dairy industry including the farmers, distributors, milk processing companies, and the government of Tanzania should collaborate to strengthen lean supply chain aspects. The government of Tanzania should also streamline policy touching on dairy production. In particular, the government should strengthen legislation relating to customer relationships, demand management, and supplier relationship.

Keywords: *Lean supply chain strategy, Performance, Dairy industry, Customer relationship strategy, Demand management strategy, Supplier relationship strategy*

1.0 Introduction

The dairy industry worldwide has been changing due to more concerns over sustainability, consumer demands, and greater efficiency requirements. The sector continuously strives for efficiency due to the price and volume competition in various countries. The demand for milk has been dramatically increasing in the world; therefore, the sector should continuously look for innovative methodologies and solutions to address such trends and improve performance through mechanisms such as lean supply chain strategies (Berut, 2020). Lean supply chain strategy is aimed at creating cost efficiencies in the supply chain by effectively managing inventory and focusing on improving the quality in the supply chain, thus eliminating waste. Karim and Mahmoud (2014) state that adopters of the lean supply chain strategy implement a just-in-time philosophy by delivering the right material, at the right time, at the right place, and in the exact amount; and as well select suppliers based on quality to achieve its low-cost strategy.

Lean supply chain strategy is a set of organizations directly linked by upstream and downstream flows of products services, finances, and information that collaborate work to reduce cost and waste by efficiently and effectively pulling what is required to meet the individual customer needs (Simone, Andrew, Kleiner & Brian 2004). The lean theory applies to all forms of production such as job shop, process, and many service environments. It is closely aligned with total quality management and supplier management initiatives (Simone *et al.*, 2004). The maintenance and building of a lean supply chain revolve around six key attributes: demand management, cost and waste reduction, process standardization, industry standardization, cultural change, and cross-enterprise collaboration (Larson & Halldorsson, 2004). In the services sector lean is not credited with the same level of popularity as in the manufacturing sector. Companies and institutions in the service sector appear to embrace many of the concepts of lean thinking without actually calling it “lean” (McManus & Kevin 2007). This paper focused on three lean supply chain components: customer relationship strategy, demand management strategy, and supplier relationship strategy.

Customer relationship strategy entails; identify customers and values where only a small fraction of the total time and effort in any organization adds value for the end customer. By clearly defining value from the end customer's perspective, all the non-value activities can be targeted for removal. Identify and map the value stream that will represent the end-to-end process that delivers value to the customer; understand their needs and identify how you are delivering on them. Create flow by eliminating waste like when the value stream is first mapped, only 5% of activities add value. Eliminating this waste ensures the product or service 'flows' to the customer without any interruption, detour, or waiting (Muloko, 2012).

Demand management strategy is a unified method of controlling and tracking business unit requirements and internal purchasing operations. It helps organizations remain engaged in their supplier relationships and related advantages. Organizations use demand management systems to address external spending factors, arrange purchase orders and eradicate waste. (Wainaina, 2009). Supplier relationship strategy is the discipline of strategically planning for, and managing, all interactions with third-party organizations that supply goods and/or services to an organization to maximize the value of those interactions. In practice, supplier relationship strategy entails creating closer, more collaborative relationships with key suppliers to uncover and realize new value and reduce risk (Muloko, 2012).

Globally, firms have adopted different supply chain strategies to enhance their performance. The adoption of supply chain strategies has helped the United States fast-food chain McDonald's to minimize waste (Chen & Ouyang, 2011). Oyuke (2014) observed that in sub-Saharan Africa, both central and local authorities as well as other government departments have embraced collaborative and integrated supply chain strategies to improve their service delivery by enhancing efficiency. In South Africa, collaboration with supply chain stakeholders and particularly involving them in the design and development of products/services enables companies to reduce their costs and risk management within supply chains (Li et al., 2016). Kenyan companies in various industries such as telecommunication, retail, and manufacturing have embraced different supply chain management strategies to achieve a competitive advantage to stay at the top of the market (Abdifatah, 2012).

The paper focused on the Southern Highlands (SH) of Tanzania, which comprises of Mbeya, Iringa, Rukwa - and Ruvuma regions. SH of Tanzania is an agriculturally high potential area and is usually referred to as the big four regions in terms of staple food production. Livestock productivity in the area forms an important part of people's occupation. The dairy sector in Tanzania has continued to suffer due to low productivity despite increasing numbers of improved animals and the availability of large land tracts for grazing. Climate change, coupled with more frequent and prolonged drought, has only made the problem more severe (Ministry of Agriculture Research and Training Institute, 2019).

1.2 Research Problem

The Tanzania dairy industry plays a significant role in the economic and nutritional aspects of the Tanzanian citizens; it is a source of income for many Tanzanians and contributes to 4.6% of Tanzania's Gross Domestic Product (GDP). Despite this contribution, the dairy industry is characterized by declining performance. According to the Tanzania Dairy Board (TDB) and the Ministry of Livestock and Fisheries Development (MOLFD), until the year 2015 only 3% of the national cattle herd comprised of improved dairy breeds, with the disproportionate contribution of 30% of the 2.5 billion liters of annual milk production. Milk production is mostly for household consumption. The country has been experiencing low milk production, which has been attributed to a shortage of improved high-yielding dairy cows, poor pastures/feeds, and failure to observe recommended husbandry practices (ESADA, 2015).

According to ADB data, the country imported more than 116,650 metric tonnes between 2008 and 2019. In 2016 milk powder constituted 58%, followed by UHT milk at 26%, mostly imported from Kenya, South Africa, Middle East, and the Netherlands. The Government raised import duty on dairy products to protect the domestic industry in 2018, which affected the cost of reconstituted milk from milk powder. Among the reasons advanced for the shrinking volume of milk received at the plant is the direct sale of milk by producers to milk vendors and consumers. This in turn has been the result of the liquidity problems of TDL due to the lack of prompt payment of producers.

Several studies have highlighted the role of supply chain strategies in enhancing organizational performance. These include Saudi, Juniati, Kozicka, and Razimi (2019); Mwangangi and Achuora (2019), Nimeh, Abdallah, and Sweis (2018) among others. However, these studies presented research gaps in form of conceptual, contextual, and methodological. The current study intended to address the aforementioned research gaps by investigating the influence of lean supply chain strategy on the performance of the dairy industry in the Iringa Region, Southern Highlands of Tanzania.

1.3 Research Objectives

- i. To determine the influence of customer relationship strategy on performance of the dairy industry in the Iringa Region, Southern Highlands of Tanzania.
- ii. To establish the influence of demand management strategy on the performance of the dairy industry in the Iringa Region, Southern Highlands of Tanzania.
- iii. To determine the influence of supplier relationship strategy on performance of the dairy industry in the Iringa Region, Southern Highlands of Tanzania.

2.0 Theoretical Framework

2.1 Resource Dependence Theory

The Resource Dependence Theory (RDT) was postulated by Godfrey (1998) and postulates that member firms in the supply chain should be dependent and cooperate in seeking greater performance gains in the long run as opposed to focusing on short term gains at the expense of other members. In resource dependence theory, firms rely on the resources provided by other firms to sustain growth and competitive advantage, including organizations that depend on them (Paloviita & Luoma-aho, 2010). RDT assumes that firms are not fully autonomous concerning strategic critical resources for survival. In lean supply chain management, resource allocation and material recovery are key resources in the organization that require supply chain partnership to improve performance. Organizations need to control critical resources, for example, human resources, procedures, material sources, standards, as well as distribution networks to implement lean supply chain management components.

Firms that consider the implementation of lean supply chain management components should take into account the supply chain members' interdependency, efficiency, effectiveness, and the quality of their association that determines success in the implementation. According to Zhu (2010), RDT highlights a very important insight that organizations without the necessary resources to achieve their goals are likely to cultivate relationships with others for the acquisition of the resources. This view considers supplier and customer relationships as very important connections for organizations to reduce the dynamics that surround their operating environment. To manage the internal and external coordination of lean supply chain management and gain in the outcomes of the performance, there is a need for inter-organizational relationships (Zhu & Sarkis, 2007).

2.2 Theory of Constraints

The theory of constraints is a system management philosophy developed by Goldratt in the year 1984. This theory suggests that managers should focus on effectively managing the capacity of the few core constraints contained in the organization if they are to improve the operational performance of the organization. The fundamental notion of the theory of constraints is that constraints establish the limits of performance for any system in the organization. According to Dettmer (1996), the theory of constraints challenges the managers on the need to reconsider some of their essential assumptions that help in achieving their goals and improve the operational performance. This theory focuses on understanding and managing the constraints that stand between an organization and the attainment of its goals.

Lean supply chain management as a strategy plays a major role in the performance of the organization that implements it and therefore the theory explains how the constraints that will be identified in the implementation of lean can be handled. The theory of constraints acts as a thinking process and helps managers in coming up with simple solutions to handle some of the most complex hitches (Goldratt, 2011). The main idea of the theory of constraints is that every real system such as a profit-making enterprise must have at least one constraint. It provides a reliable process that insists on follow through and focuses on the enhancement of

strategies in the areas where they will be of great impact on the bottom line and it's all about focus and follows through (William, 1996).

3.0 Empirical Review

Saudi, Juniati, Kozicka, and Razimi (2019) investigated various lean supply chain practices to boost supply chain performance in the Malaysian electronic industry. Lean practices include; cellular layout, 5S, and visual management. A survey was conducted, and a questionnaire was distributed among the employees of electronic companies in Malaysia. In the current study, the structural equation modeling (SEM) technique was used. It was found that lean practices had a significant positive relationship with supply chain performance. However, the study presents several research gaps. First, there is a contextual gap since the study was conducted in Malaysia, which is a different environment from Tanzania. Second, there is a conceptual gap since the study used different lean supply chain strategies from what the current user has adopted. Further, there exists a methodological gap as the study used SEM, while the current study uses a linear regression model.

Mwangangi and Achuora (2019) studied the influence of the lean supply chain on the performance of Public Universities in Kenya. The research adopted a descriptive design. The target population of this study was employees in administration, accounts, and procurement departments in public universities. The study established a significant positive relationship between lean supply chain and organizational performance. This implies that an increase in organizational performance in public universities in Kenya is likely through the adoption of lean supply chain initiatives. The study recommends that lean supply chain management requires public universities to examine every process in their supply chain. This will improve the organization's competitiveness as well as improve the organization's overall profitability. Nonetheless, the study presented a contextual because it was conducted in Kenya and did not focus on the dairy industry in Tanzania.

Nimeh, Abdallah and Sweis (2018) investigated the effects of lean supply chain management (LSCM) practices on supply chain performance and market performance of manufacturing companies in Jordan. Five LSCM practices were identified based on an extensive literature review, namely, just-in-time system, the flow of information, supplier relationship, customer relationship, and waste reduction. To achieve the study goals, a survey questionnaire was prepared and distributed to managers of 400 manufacturing companies from different industries and sizes. The final number of usable questionnaires was 308, representing a response rate of 77%. The results revealed positive and significant effects of three LSCM practices on market performance, namely, the just-in-time system, the flow of information, and customer relationship. In addition, all LSCM practices showed positive and significant effects on supply chain performance. Furthermore, supply chain performance demonstrated a positive and significant effect on market performance. The study was carried out in Jordan, therefore, presenting a contextual gap. Jordan operates in a different environment from Tanzania.

Moyano-Fuentes, Maqueira-Marín, Martínez-Jurado, and Sacristán-Díaz (2020) evaluated the contribution to improving the efficiency of the focal firm made by lean management at the internal and supply chain level. An empirical study was conducted of 285 Spanish focal companies from industrial sectors that occupy an intermediate position in the supply chain. The data gathering method consisted of a telephone survey using computer-assisted telephone interviewing. A structural equation was used to test the hypotheses. The results indicated that there was an improvement in the efficiency of the focal firm when lean management extends throughout the supply chain. In addition, lean management at the internal level was observed to impact positively on the focal firm's efficiency only when it contributed to enhancing the

implementation of lean supply chain management. The study focused on firms in Spain and not the dairy industry in Tanzania.

Muchiri (2017) examined the impact of lean supply chain management practices on organizational performance of Parastatals in the Ministry of energy and petroleum in Kenya. The study adopted a descriptive research design. The target population included all 8 Parastatals in the Ministry of Energy and Petroleum. The study collected primary data using a questionnaire. The study findings revealed that parastatals in the ministry of energy and petroleum adopted specific lean supply chain management practices that were aligned to its corporate strategy in running its value chain function and these practices had significantly contributed to the performance and hence creating competitive edge of the parastatals. The study concluded that the adoption of lean supply chain practices improved organizational performance. The improved performance was reflected through minimized waste in the manufacturing process, reduced manufacturing cycle time, improved working capital, reduced customer lead time, increased space-saving, and increased response to customers. The study focused on Parastatals in the Ministry of energy and petroleum in Kenya as opposed to the dairy industry in the Iringa Region, Southern Highlands of Tanzania.

4.0 Conceptual Framework

Independent Variables

Dependent Variable

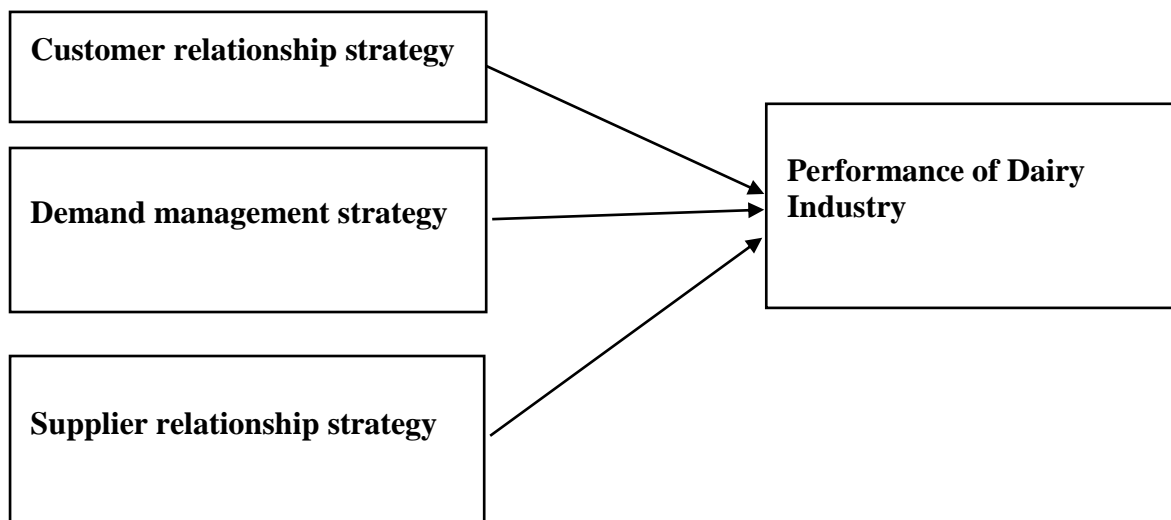


Figure 1: Conceptual Framework

5.0 Research Methodology

The study adopted the descriptive research design. The target population was employees working at the milk processing plant in Iringa Municipality. A total of 60 employees were targeted. A census of all the employees was conducted since the target population was small. Primary data was collected using structured questionnaires. Descriptive statistics including percentages and means were used to describe the data. Regression analysis was used to establish the relationship between the study variables. Results were presented using frequency tables.

6.0 Results and Discussion

The study findings are presented in form of descriptive statistics and regression analysis.

6.1 Descriptive Statistics

This section provides descriptive statistic findings in terms of percentages, mean and standard deviation.

Table 1: Customer Relationship Strategy

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	M	Std. dev
Customers are attracted and maintained	2.2%	13.3%	8.9%	11.1%	64.4%	4.2	1.2
There is close relationship with customers	6.7%	15.6%	6.7%	13.3%	57.8%	4.0	1.4
Reduced waiting time is experienced by the customer	4.4%	6.7%	17.8%	15.6%	55.6%	4.1	1.2
Customers are given an opportunity to measure the service they get	6.7%	22.2%	4.4%	13.3%	53.3%	3.8	1.4
Aggregate mean						4.0	1.3

The findings in Table 1 indicate that majority of the respondents (75%) agreed with the assertion that customers are attracted and maintained, there is a close relationship with customers (71.1%), reduced waiting time is experienced by the customer (71.2%), and customers are allowed to measure the service they get (66.6%). The aggregate mean of 4.0 with a standard deviation of 1.3 indicated that most of the respondents agreed with the statements on customer relationship strategy. This means that customer relationship strategy is an essential aspect of lean supply chain strategy.

Table 2: Demand management strategy

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	M	Std. dev
There is an alternative means of meeting customer demands	4.4%	11.1%	17.8%	28.9%	37.8%	3.8	1.2
The company uses technology to overcome overwhelming demand	4.4%	6.7%	8.9%	26.7%	53.3%	4.2	1.1
The company anticipate customer demands in advance	4.4%	17.8%	15.6%	24.4%	37.8%	3.7	1.3
The company utilizes resources effectively to meet customer demands	8.9%	8.9%	13.3%	17.8%	51.1%	3.9	1.4
Aggregate mean						3.9	1.2

The findings in Table 2 indicate that majority of the respondents (66.7%) agreed with the assertion there is an alternative means of meeting customer demands, the company uses technology to overcome overwhelming demand (80%), the company anticipate customer demands in advance (62.2%), and the company utilizes resources effectively to meet customer demands (68.9%). The aggregate mean of 3.9 with a standard deviation of 1.2 indicated that most of the respondents agreed with the statements on-demand management

strategy. This means that demand management strategy is an essential aspect of lean supply chain strategy.

Table 3: Supplier relationship strategy

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	M	Std. dev
There is mutual relationships among stakeholders	4.4%	17.8%	11.1%	15.6%	51.1%	3.9	1.3
There is close collaborations with suppliers	2.2%	6.7%	11.1%	11.1%	68.9%	4.4	1.1
Suppliers are selected based on quality	6.7%	11.1%	8.9%	20.0%	53.3%	4.0	1.3
Suppliers are vetted by quality management boards	8.9%	8.9%	8.9%	15.6%	57.8%	4.0	1.4
Aggregate mean						4.1	1.3

The findings in Table 3 indicate that majority of the respondents (66.7%) agreed with the statement that there are mutual relationships among stakeholders, there are close collaborations with suppliers (80%), suppliers are selected based on quality (73.3%), and suppliers are vetted by quality management boards (73.4%). The aggregate mean of 4.1 with a standard deviation of 1.3 indicated that most of the respondents agreed with the statements on supplier relationship strategy. This means that supplier relationship strategy is an essential aspect of lean supply chain strategy.

Table 4: Performance of Dairy Industry

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	M	Std. dev
The operational efficiency has improved due to the adoption of the lean supply chain management components by the company	6.7%	13.3%	6.7%	26.7%	46.7%	3.9	1.3
Lean supply chain adoption has reduced operational costs	2.2%	15.6%	15.6%	13.3%	53.3%	4.0	1.2
Quality of the products has been enhanced	13.3%	20.0%	8.9%	15.6%	42.2%	3.5	1.5
The level of waste has reduced since the adoption of lean supply chain components	15.6%	6.7%	4.4%	17.8%	55.6%	3.9	1.5
Aggregate mean						3.8	1.4

The findings in Table 4 indicate that majority of the respondents (73.4%) agreed with the statement that the operational efficiency has improved due to the adoption of the lean supply

chain management components by the company, lean supply chain adoption has reduced operational costs (66.6%), quality of the products has been enhanced (57.8%), and the level of waste has reduced since the adoption lean supply chain components (73.4%). The aggregate mean of 3.8 with a standard deviation of 1.4 indicated that most of the respondents agreed with the statements on performance.

6.2 Regression Analysis

A multiple linear regression analysis was carried out to test the relationship between the independent variables and dependent variables. The findings are shown in Tables 5, 6, and 7 respectively.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.884a	0.782	0.766	0.40714

a Predictors: (Constant), x3, x1, x2

The model summary results in Table 5 indicate that all the three independent variables jointly explain 78% ($R^2 = .782$) of the total variations in the performance of the dairy industry. This implied that jointly, the independent variables are strong determinants of the performance of the dairy industry.

Table 6: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.365	3	8.122	48.995	.000b
	Residual	6.796	41	0.166		
	Total	31.161	44			

a Dependent Variable: y

b Predictors: (Constant), x3, x1, x2

The ANOVA results in Table 6 reveal an F statistic of 48.995 and a P-value of 0.000. The P-value being less than the alpha value ($P < .05$), the proposed model is therefore statistically significant (good fit) in predicting the dependent variable.

Table 7: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-2.189	0.534		-4.1	0.000
	X1	0.966	0.285	0.613	3.395	0.002
	X2	0.443	0.171	0.411	2.588	0.004
	X3	0.657	0.116	0.507	5.665	0.000

a Dependent Variable: y

Model

$Firm\ performance = -2.189 + 0.966\ Customer\ relationship\ strategy + 0.443\ Demand\ management\ strategy + 0.657\ Supplier\ relationship\ strategy$

The coefficient results in Table 7 indicate that customer relationship strategy has a positive and significant effect on the performance of the dairy industry ($\beta_1 = 0.966$, $P = .002$). The demand management strategy has a positive and significant effect on the performance of the dairy industry ($\beta_2 = 0.443$, $P = .004$). Supplier relationship strategy has a positive and significant effect on the performance of the dairy industry ($\beta_3 = 0.657$, $P = .000$).

The findings concur with Saudi, Juniati, Kozicka, and Razimi (2019) results that lean practices had a significant positive relationship with supply chain performance. Mwangangi and Achuora (2019) also established a significant positive relationship between lean supply chain and organizational performance. Further, Nimeh, Abdallah, and Sweis (2018) found a positive and significant effect of three LSCM practices on market performance. Moyano-Fuentes, Maqueira-Marín, Martínez-Jurado, and Sacristán-Díaz (2020) established that there was an improvement in the efficiency of the focal firm when lean management extends throughout the supply chain. Additionally, Muchiri (2017) concluded that the adoption of lean supply chain practices improved organizational performance.

7.0 Conclusion

Based on the findings, the study concluded that lean supply chain strategy significantly influences the performance of the dairy industry in the Iringa Region, Southern Highlands of Tanzania. In particular, the study concluded that lean supply chain components including customer relationship strategy, demand management strategy, and supplier relationship strategy had a positive and significant effect on the performance of the dairy industry in the Iringa Region, Southern Highlands of Tanzania. This implies that an improvement of the lean supply chain components will result in enhanced performance of the dairy industry.

8.0 Recommendations

The study recommended that stakeholders in the dairy industry including the farmers, distributors, milk processing companies, and the government of Tanzania should collaborate to strengthen lean supply chain aspects. The government of Tanzania should also streamline policy touching on dairy production. In particular, the government should strengthen legislation relating to customer relationships, demand management, and supplier relationship.

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