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SUPPLY CHAIN OPTIMIZATION AND PERFORMANCE OF DAIRY PROCESSING FARMS IN KIAMBU COUNTY, KENYA

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ABSTRACT

Supply chain optimization involves reducing costs and inventories through optimizing a company's R&D, material supply, production, and distribution operations. The concept of optimization has laid the groundwork for large-scale optimization of a company's supply, production, and distribution activities to minimize costs and inventories. The objective of this study was to examine effect of supply chain optimization on performance of dairy processing firms in Kiambu County, Kenya. The specific objects was to examine effect of; distribution channels, and demand planning on performance of dairy processing firms in Kiambu County, Kenya. The study was anchored on the theory of distribution channel, and rational expectations theory. The study adopted a descriptive research design. The study population was 78 supply chain managers from the dairy processing firms in Kiambu County. The study adopted census hence all the supply chain managers were sampled. The study used questionnaires for data collection. Pilot was conducted with 10% of the sample size therefore eight supply chain managers. The study used face and construct validity. The study used Cronbach's alpha scale to test for questionnaires' reliability. Data was analyzed quantitatively using SPSS version 28. Quantitative data was analyzed using descriptive and inferential statistics (correlation and regression). Findings were tabulated. Findings showed that; there is a strong significant relationship between distribution channel and performance of dairy processing firms in Kiambu County, Kenya ($r = 0.649$, p-value=0.000), and a strong significant relationship between demand planning and performance of dairy processing firms ($r = 0.637$, p-value=0.000). The researcher recommends that; the dairy firms should automate the ordering process to increase accuracy and efficiency of order deliveries, firms should have more distribution agents and warehouses in various shopping centres countywide, firms need to ensure that they have a balanced production where they meet customer demand without overproducing and wasting valuable resources.

Key Words: Supply chain optimization, Distribution channels, Demand planning, Performance of dairy processing firms

Background of the Study

A Supply Chain (SC) is commonly referred to as a system of organizations, individuals, processes, information (or material), and resources that are required to move a product from suppliers to customers (Hu et al., 2015). Supply Chain Optimization (SCO) is the process of combining resources in an SC to eliminate difficulties that slow down the process and allow the supply chain to run more smoothly, quickly, and efficiently (Khayyat, 2015). SCO is more important for the success of industrial organizations. SC optimization involves reducing costs and inventories through optimizing a company's R&D, material supply, production, and distribution operations. The concept of optimization has laid the groundwork for large-scale optimization of a company's supply, production, and distribution activities to minimize costs and inventories (Garcia & You, 2015).

Supply chain optimization makes the most of technology and resources like blockchain, and IIoT (Industrial Internet of Things) to improve efficiency and performance in a supply network. A company's supply chain is a critical business function that assures a great customer experience. Customers get what they want, when and where they want it, thanks to a high-performing supply chain that is both lucrative for the company and helps to supply chain sustainability. Supply chains are complicated, but they pay off in terms of technology, particularly when block chain is integrated with AI and IoT (Wang & Hu, 2020). Optimization of stock points will result in significant reduction in supply chain risk by well-defined freight routes and a reduction in channel inventories (Kavilal et al., 2018). Supply chain optimization can also be attained through organizational resilience. The organization can develop preventive capacity in order to face any unexpected disruptions. It also helps in taking the necessary and quick actions to respond and recover from disruptions to ensure business continuity (Jia et al., 2020).

Statement of the Problem

Kenyan dairy industry is core to the Kenyan economy contributing 4% to the economy, estimated 14% of total agricultural GDP, and about 44% contribution of livestock GDP, (Odero, 2017). The dairy sector is a source of livelihoods to 1.83 million small scale business farmers, offers an approximated 750,000 direct jobs and about 500,000 indirect jobs (KDB, 2019). However, market prices remain comparatively low and unchanged regardless of skyrocketing costs of production hence lowering the profit margins. Milk supplies by farmers and market trends has also led to uneven profitability trends leading to financial challenges to the dairy firms. This has resulted to financial distress for a number of dairy operations to many dairy farmers in terms of the milk prices, credit payment periods and also returns at the end of the year. The firms are hence not able to get the returns on their investments which is an indicator of poor performance.

A constant decline in the consumption of processed milk products has accelerated the poor performance of milk processing firms in Kenya (Onam, Omondi & Battenweck, 2019). There has been a reported 6.7% decline in the performance of the dairy industry in 2019 (KDB, 2020). The report further noted that dairy milk processing firms in Kenya are struggling to get it right in providing service quality. There has been an increase of customer complains due to poor quality of milk which include expiry before the date indicated on the pack. Customer dissatisfaction leads to withdraw from a certain brand, low sales, and low profits. Dairy milk processors in Kenya have poor consumer complaints handling mechanisms which affect consumer satisfaction. This has led to merging of some dairy milk processing firms and loss of jobs due to closure of some dairy milk processing firms (Mwangi, Kabare, & Wanjau, 2018). According to Maina et al., (2020), only 12% of marketed milk makes it to the processing plants in Kenya. The capacities invested in by milk processors are underutilized by over 54% annually. Besides, the move towards sustainable supply chains has seen firms adopt better ways of packaging that have reportedly been expensive.

The recent ban on plastics bags hit hard on most milk processors and has affected their performance (NEMA, 2020).

Various researchers have conducted studies related to supply chain. substantial interest in lean thinking by researchers especially in the manufacturing sector. Mwangi (2019) study on the influence of supply chain optimization on the performance of manufacturing firms in Kenya revealed that supply chain optimization significantly predict firm performance; Owino (2015) studied effect of supply chain integration on organizational performance of commercial banks in Kenya and found out that use of integration in the supply chain by the banks is significantly related to bank performance; Korir, Bonuke, and Chepkwony (2017) sought to determine effect of supply chain operational capabilities and firm performance in state corporations in Kenya and revealed that supply chain operational capabilities have a positive and significant effect on firm performance. However there is study limitation on supply chain optimization and performance of dairy processing firms in Kiambu County, Kenya. This study hence seeks to fill the research gap.

Research Objectives

i. To assess the effect of distribution channels on performance of dairy processing firms in Kiambu County, Kenya
ii. To establish the effect of demand planning on performance of performance of dairy processing firms in Kiambu County, Kenya.

LITERATURE REVIEW

Theoretical Review

Theory of Distribution Channel

Theory of Distribution Channel was propounded by Bucklin (1966). The theory states that each company in the demand channel must charge enough to pay expenses and leave a profit (Johnson ,2009). Distribution strategies are the intermediary organizations or channels that a product passes through before it is consumed or used. According to Stern and Reve (1980), channel theory is divided into two orientations; economic and behavioral approaches. First analyses the efficiency of the strategy, studying issues like channel design and structure. The second one is sociologically oriented, focusing on power, cooperation and customer satisfaction. In a context of consumer products, processors differ on how they distribute their products to the consumer. Some of them distribute intensively (using a lot of intermediaries) or exclusively (directly to the consumer). The role of distribution is to provide for a company, the accomplishment of the task of delivering the product at the right time, place and quantity at a minimum cost (Bucklin, 1966). This theory tries to relate the effect of milk distribution channels to firm performance.

Rational Expectations Theory

The theory was developed by John (1961). The theory assumes that people do not make systematic errors when predicting the future, and deviations from perfect foresight are only random. The influences between expectations and outcomes flow both ways. In forming their expectations, people try to forecast what will actually occur (Sargent, 1987). They have strong incentives to use forecasting rules that work well because higher "profits" accrue to someone who acts on the basis of better forecasts. When people have to forecast a particular price over and over again, they tend to adjust their forecasting rules to eliminate avoidable errors. Thus, there is continual feedback from past outcomes to current expectations. In recurrent situations the way the future unfolds from the past tends to be stable, and people adjust their forecasts to conform to this stable pattern. Economists who believe in rational expectations base their belief on the standard economic assumption that people behave in ways that maximize their utility (their enjoyment of life) or profits (Savin, 1987). Economists have used the concept of rational expectations to understand a

variety of situations in which speculation about the future is a crucial factor in determining current action. Demand forecasting would help milk processor to approximate the stocks needed to ensure they meet the demand of the customers.

Conceptual Framework

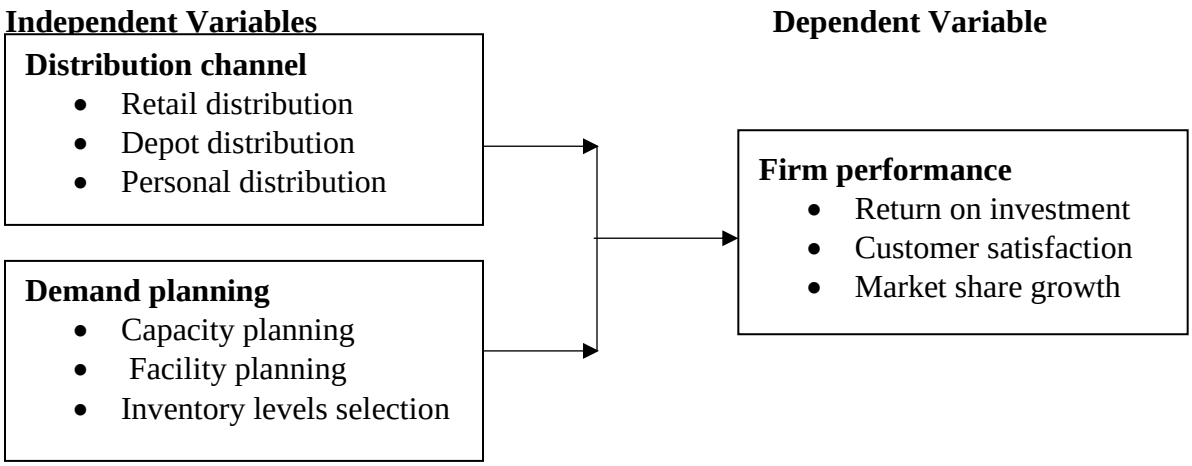

Figure 1: Conceptual Framework

Distribution Channel

Distribution refers to the transfer of goods from a processor to the wholesaler, retailer or consumers. It can be factory to supplier, supplier to retailer, or retailer to end customer. It is defined as a chain of intermediaries; each passing the product down the chain to the next organization, before it finally reaches the consumer or end-user. This process is known as the 'distribution chain' or the 'channel.' Each of the elements in these chains will have their own specific needs, which the producer must take into account, along with those of the all-important end-user (Alene, 2018). Stock and Lambert (2016) enunciates distribution occurs between every pair of stages in the supply chain and describes it as the key driver of overall profitability of a firm since it affects both cost and the customer experience directly. The ultimate goal of a distribution network plan is a supply chain properly balanced between inventory, transportation, and manufacturing.

According to Mor et al. (2018), effective distribution channels play a crucial role in increasing market penetration and customer satisfaction. They ensure that dairy products are available in the right quantities, at the right time, and in the right location, which can lead to increased sales and profits. For instance, a well-designed distribution channel can help dairy processing firms in Kiambu County, Kenya, to reach new markets, expand their customer base, and increase revenue streams. However, a poorly designed or managed distribution channel can negatively impact a firm performance. For instance, delays in product delivery, stock-outs, and poor product quality can lead to decreased customer loyalty and revenue loss (Ding et al., 2019). In the context of the dairy industry, the distribution channel plays a critical role in ensuring that products are efficiently and effectively transported from the manufacturer to the final consumers. As such, it encompasses all the activities involved in the movement of products, including warehousing, transportation, and retailing. The distribution channel involves various intermediaries, such as wholesalers, retailers, and distributors, who act as the link between the manufacturers and the consumers.

Demand Planning

Demand planning is a crucial activity that enables dairy processing firms to anticipate the future demand for their products and develop appropriate strategies to meet that demand. Effective demand planning involves collecting and analyzing market data, such as customer preferences,

purchasing behavior, and trends, to forecast future demand accurately (Moazzam et al., 2018). This process helps dairy firms to avoid stock-outs or overproduction, which can lead to increased inventory costs and reduced profitability.

The aim is to accelerate the flow of raw materials, materials and services beginning with the suppliers through transforming to products in the company and to their distribution to their final consumers. The demand planning process is done to help the business understand profit potential. Indirectly it sets the stage for capacity, financing, and stake-holder confidence (Sheldon 2016). The implementation of the demand planning enables to determine the closest possible forecast to the planning horizon and decide the volume of production, stock and sources capacity distribution among particular products to maximize the profits of the whole company.

Effective customer demand planning is one of the key drivers of a supply chain success. Poor customer demand planning can lead to top-and bottom-line effects which many organizations fail to recognize. Taking a top-line perspective, poor customer demand planning can lead to not being able to take full advantage of the demand of products and also to the failure in developing the supply chain to answer the demand. From a bottom-line perspective, the advantages of good customer demand planning include the minimization of inventory and other costs (Mentzer & Moon 2015). Moreover, effective demand planning can lead to improved customer satisfaction, as firms can ensure that they have enough products to meet customer needs and preferences. By aligning their production plans with anticipated demand, dairy processing firms can optimize production processes, reduce wastage, and improve overall efficiency, enhancing profitability (Moazzam et al., 2018).

Empirical Review

Distribution Channel and Firm Performance

Mor, Bhardwaj, and Singh (2018) conducted a comprehensive analysis of supply chain practices in the dairy industry, examining the distribution channel and its impact on the performance of dairy processing firms. They conducted a structured literature review and reported on the creation of a green multi-objective optimization model that addresses the capacity constraints in the distribution channel for the demand side of a two-layer dairy market supply chain in Ireland. The model incorporates cost and environmental performance, providing a more holistic view of supply chain optimization in the dairy industry. Overall, their research sheds light on the importance of effective distribution channel management in enhancing the performance of dairy processing firms.

Kuma (2019) study on the dairy market access and value chain in Ethiopia provides insights into the role of distribution channels in optimizing supply chain performance for dairy processing firms. The study highlights the importance of access to alternative milk market outlet choices and factors affecting unpacked and packed fluid milk consumption, critical aspects of distribution channel optimization. Dairy processing firms can improve their logistics and distribution network economy by addressing these constraints, ultimately enhancing their performance. In addition, the study emphasizes the need to focus on value addition to increase the profitability of dairy products, which can be achieved by leveraging efficient distribution channels to reach a wider market. Therefore, optimizing the distribution channels can lead to increased market access, reduced transaction costs, and enhanced supply chain performance for dairy processing firms.

Chugi (2022) investigation explored the distribution network economy and logistics performance of fresh milk processing firms in Kenya, employing a descriptive design approach. The study targeted all 42 licensed milk processing firms in Kenya, and primary data was collected through electronic mail and physically delivered questionnaires. The results indicated that the positive and significant relationship between distribution network collaboration, transport management,

distribution information technology optimization, backhaul management, and omnichannel distribution positively impacts the logistics performance of fresh milk processing firms in Kenya.

Demand Planning and Firm Performance

Ding et al. (2019) conducted a questionnaire survey to investigate the determinants of competitive advantage in dairy supply chains in China. They found that production behavior and dairy cow culture models are crucial determinants of competitive advantage through quality assurance of dairy products. This indicates that demand planning must consider production behavior and dairy cow culture models to ensure quality assurance in dairy products. In another study, Kuma (2019) used participatory, rapid market appraisal, and survey methods to collect primary data from a random sample of 398 farmers, 198 consumers, 79 traders, and 53 hotels/restaurants to analyze the market access and value chain of dairy products in Ethiopia. The study identified critical determinants of participation decision and level of participation in-farm level milk value addition, factors affecting milk sales decision and access to alternative milk market outlet choices, determinants of fluid milk purchasing sources, and factors affecting unpacked and packed fluid milk consumption. Therefore, demand planning must consider these determinants to optimize the supply chain and improve the performance of dairy processing firms.

Similarly, Berut (2020) investigated the influence of supply chain collaboration on the performance of dairy processing firms in Kenya. The study targeted 10,488 fresh milk suppliers and 13,906 customers of processed milk products buying at Nakumatt retail supermarket. They used a mixed research design that covered qualitative and quantitative research. The study found that supply chain information sharing, incentive alignment, teamwork, and mediation of dairy board policies and regulations are essential for the performance of dairy processing firms. Thus, demand planning must consider collaboration with supply chain partners to optimize the supply chain and improve the performance of dairy processing firms.

Firm performance

In a global study conducted by Susanty et al. (2017), the researchers investigated the impact of trust, loyalty, and business performance on Indonesia's dairy milk supply chain. The study utilized primary data collected through personal interviews and closed questionnaires from 170 individual dairy farmers and several dairy cooperatives in Central Java Province and West Java Province. Collaborative communication and price satisfaction were found to have a significant positive effect on trust, which, in turn, positively affected supplier loyalty. The study recommended that dairy cooperatives involve farmers in decision-making and have transparent policies on milk prices to improve supplier loyalty and business performance. Additionally, adding value to milk products could help access wider markets, increasing members' returns.

Similarly, Kuma (2019) studied dairy products' market access and value chain in the Wolaita zone, Ethiopia. The study utilized both primary and secondary data sources to analyze milk production, sales, and value addition by farmers, consumers, traders, and hotels/restaurants. Farmers produced an average milk yield of 8 liters per day, of which 58.2% was sold to market outlets, and 26.6% was used for value addition. The study identified several constraints to the dairy industry, such as lack of access to extension services, distance from urban centers, and inadequate shelf life. The study recommended policies to address these constraints and encouraged cooperatives to add value to milk products to increase access to markets, which would improve the performance of dairy processing firms. Another study by Joto (2018) investigated the effect of logistics outsourcing on the performance of dairy processing firms in Kenya. The study was a census survey of 28 dairy processors in Kenya, and primary data were collected through a structured questionnaire from logistics managers or their equivalents. The study found that outsourcing logistics positively impacted the performance of dairy processing firms, including cost reduction, improved service

delivery, and increased customer satisfaction. The study recommended that dairy processing firms consider outsourcing logistics to improve their performance in the supply chain.

RESEARCH METHODOLOGY

The study adopted a descriptive research design. The study target population was dairy processing firms in Kiambu County, Kenya. According to the Kenya Diary Board, there are 78 dairy processing firms in Kiambu County. The study hence targeted the supply chain managers since they are well conversant with the supply chain management practices in the firms. The study adopted census whereby all units were considered as the sample.

The study used close-ended questionnaires for data collection. A pilot study was conducted prior to the actual data collection. The test was aimed at testing the questionnaires' validity and reliability. A pilot was conducted with 10% of the sample size. Therefore, eight supply chain managers were used for piloting. Data collected was coded, keyed into SPPS version 28 for analysis and cleaned. This enable the researcher to generate statistics for the study variable. The study used descriptive statistics (percentage, frequency, and mean), and inferential statistics (correlation and regression)

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

The researcher distributed 70 questionnaires to the respondents and 62 were successfully filled and returned. Thus the response rate of was 88.6% which is very good for analysis. Creswell (2017) asserted that 50% response rate is adequate, 60% is good and more than 70% very good. The high response rate was achieved as a result of intense training of research assistants and close monitoring of the data collection process.

Distribution Channels

The first objective sought to assess the effect of distribution channels on performance of dairy processing firms in Kiambu County, Kenya.

Table 1: Distribution Channels

Statements	SD		D		N		A		SA		M
	F	%	F	%	F	%	F	%	F	%	
The firm continuously maintains manageable transport costs in creating access to service delivery	11	17.7	5	8.1	2	3.2	12	19.4	32	51.6	3.79
The firm balances various transport modes to minimize time in transit	2	3.2	4	6.5	0	0	23	37.1	33	53.2	4.31
The firm relies on the transport function to create access and connectivity within the supply chain	3	4.8	6	9.7	11	17.7	5	8.1	37	59.7	4.08
The firm employs transport management practices to create efficiency and better access	8	12.9	2	3.2	1	1.6	13	21.0	38	61.3	4.15
The firm has various distribution centres near the customer to reduce the cost of transport	18	29.0	34	54.8	0	0	1	1.6	9	14.5	2.08
The firm has various warehouses countrywide	15	24.2	37	59.7	1	1.6	7	11.3	2	3.2	2.51
The firm ensure that the trucks loads are optimized during delivery	2	3.2	7	11.3	1	16	15	24.2	37	59.7	4.26
IT is used to integrate all supply chain partners to form a distribution network	8	12.9	2	3.2	4	6.5	10	16.1	38	61.3	4.10
We collaborate with our customers for efficiency delivery and returns	3	4.8	2	3.2	5	8.1	23	37.1	29	46.8	4.18

N=62

Findings show that the respondents strongly agreed that; the firm balances various transport modes to minimize time in transit (m=4.31), and the firm ensure that the trucks loads are optimized during delivery (m=4.26). Respondents also agreed that they collaborate with their customers for efficiency delivery and returns (m=4.18), the firm employs transport management practices to create efficiency and better access (m=4.15), IT is used to integrate all supply chain partners to form a distribution network (m=4.10), the firm relies on the transport function to create access and connectivity within the supply chain (m=4.08), and the firm continuously maintains manageable transport costs in creating access to service delivery (m=3.79). Respondents however disagreed that the firm has various warehouses countrywide (m=2.51), and the firm has various distribution centres near the customer to reduce the cost of transport (m=2.08). Findings imply that the firms have effective delivery channels. They have adequate tracks to ensure that products are delivered to the customers and have also put in place transport management systems. This enable the supply chain managers to assess the distribution of the dairy customers and update customers on real time. The firms have however overlooked the importance of distribution centres and warehouses in different locations countrywide. This would help to reduce distribution costs and also delivery especially in location that are far from the firms. Findings supports Kuma (2019) that optimizing the distribution channels can lead to increased market access, reduced transaction costs, and enhanced supply chain performance for dairy processing firms.

Demand Planning

To establish the effect of demand planning on performance of performance of dairy processing firms in Kiambu County, Kenya. Respondents were asked to tick on the extent to which they agree with listed statements related to firms' demand planning. Findings are presented in Table 4.5.

Table 2: Demand Planning

Statements	SD		D		N		A		SA		M
	F	%	F	%	F	%	F	%	F	%	
Our statistical forecasts are generated by the organization's forecasting software/system	3	4.8	5	8.1	0	0	19	30.6	35	56.5	4.26
The firm carries out market research to ensure that the firm products meet market needs	27	43.5	16	25.8	0	0	13	21.0	6	9.7	2.44
Our management techniques help guard against the biases and inconsistencies of human judgment in products demand	4	6.5	5	8.1	0	0	8	12.9	45	72.6	4.37
Forecasting helps the firm to predict demand and fulfill the customer orders as and when they arise	2	3.2	3	4.8	0	0	16	25.8	41	66.1	4.47
Forecasting demand reduces the instances of shortages in this firm	7	11.3	8	12.9	2	3.2	13	21.0	32	51.6	3.89
Forecasting demand leads to reduction of inventory levels	4	6.5	1	1.6	4	6.5	40	64.5	13	21.0	3.40
Forecasting demand leads to reduction of time used in the management of inventory	1	1.6	6	9.7	0	0	11	17.7	44	71.0	4.53

N=62

Findings show that majority of the respondents strongly agreed that; forecasting demand leads to reduction of time used in the management of inventory (m=4.53), forecasting helps the firm to predict demand and fulfill the customer orders as and when they arise (m=4.47), the management techniques help guard against the biases and inconsistencies of human judgment in products demand (m=4.37), and the statistical forecasts are generated by the organization's forecasting software/system (m=4.26). Respondents agreed that forecasting demand reduces the instances of shortages in this firm (m=3.89), and forecasting demand leads to reduction of inventory levels

(m=3.40). The supply chain managers however disagreed that the firm carries out market research to ensure that the firm products meet market needs (m=2.44).

The findings imply that the firms conducts demand forecasting which enables them to study the market. Demand planning helps to avoid over or under production. Overproduction when the demand is low will result to wastage while underproduction when the demand is high results to unmet clients' needs which may ruin the company's brand. There is however low market research and the firms may lack accurate statistics on customers' demand. Findings are in support of Ding et al. (2019) that meeting customers demands is a crucial determinant of competitive advantage of dairy products.

Performance of Dairy Processing Firms

The researcher further sought to examine performance of performance of dairy processing firms in Kiambu County, Kenya. Findings are presented in Table 3.

Table 3: Project Performance

Statements	SD		D		N		A		SA		M
	F	%	F	%	F	%	F	%	F	%	
Profitability has improved over the years	22	35.5	26	41.9	3	4.8	6	9.7	5	8.1	2.39
There is improved product quality	4	6.5	17	27.4	4	6.4	14	22.6	23	37.1	3.24
Customers complaints have reduced	7	11.3	10	16.1	7	11.3	15	24.2	23	37.1	3.58
Sales volume in our firm has improved over the years	18	29.0	20	32.3	3	4.8	12	19.4	9	14.5	2.57
Our products have reached various markets nationally and internationally	6	9.7	10	16.1	3	4.8	25	40.3	18	29.0	3.37

N=62

Findings show that the supply chain managers agreed that customers complaints have reduced (m=3.58), the products have reached various markets nationally and internationally (m=3.37), and there is improved product quality (m=3.24). The respondents disagreed that sales volume in our firm has improved over the years (m=2.57) and profitability has improved over the years (m=2.39). Findings imply that although the companies have been producing quality products that meets clients expectations, the sales have been reducing and the profits as well. Findings support Onam, Omondi and Battenweck, (2019) that there has been a constant decline in the consumption of processed milk products and decline in the performance of the dairy industry in Kenya.

Correlation Analysis

The study used correlation to measure the strength and the relationship between the study variable. Pearson Correlation was used to establish the strength of the relationship between supply chain optimization and performance of dairy farms in Kiambu County. A correlation value of ± 0.5 shows a strong correlation, ± 0.30 to ± 0.49 moderate correlation while ± 0.29 is a small correlation. Significance is less than α=0.05. Correlation findings are presented in Table 4.

Table 4: Correlation Coefficients

Variables		Performance	Distribution channel	Demand planning
Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
Distribution channel	Pearson Correlation	649*	1	
	Sig. (2-tailed)	.000		
Demand planning	Pearson Correlation	.637*	.465	1
	Sig. (2-tailed)	.000	.002	

*. Correlation is significant at the 0.01 level (2-tailed)

**. Correlation is significant at the 0.05 level (2-tailed)

According to the results in Table 4, there is a strong significant relationship between distribution channel and performance of dairy processing firms in Kiambu County, Kenya (r = 0.649, p-value=0.000), a strong significant relationship between demand planning and performance of dairy processing firms (r = 0.637, p-value=0.000). This implies that distribution channel had the greatest effect of firm performance, followed by demand planning. Findings supports; Chugi (2022) that there is a positive and significant relationship between distribution network collaboration and performance of fresh milk processing firms in Kenya, Berut (2020) that demand planning has a significant influence on performance of dairy firms

Regression Analysis

A regression analysis was conducted to establish how a unit change in supply chain optimization predict changes in performance of dairy farms in Kiambu County. Regression findings are presented in Table 5-7.

Table 5: Model Summary

Model	R	R Square	Adjusted R^2	Std. Error of the Estimate
1	0.789	0.637	0.528	.670

a Predicators: (constant) distribution channels, demand planning,

The results show that the value of R^2 is 0.637. This shows that supply chain optimization practices studied (distribution channels, material management, demand planning, and inventory control) accounts for 63.7% to performance of dairy farms in Kiambu County. Therefore, other factors excluded from this study account for 36.3% changes in performance of dairy farms in Kiambu County.

Table 6: Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	18.637	4	4.659	2.708	.039[b]
	Residual	98.073	57	1.721		
	Total	116.710	61			

a Predicators: (constant) distribution channels, demand planning

b Dependent variable: performance

Findings showed that the regression model was significant (p-value = 0.000) at 0.05 hence there was a linear relationship between supply chain optimization practices and performance of dairy farms in Kiambu County. The F is 2.708 which shows that the model is suitable in testing the relationship between independent and dependent variable.

Table 7: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant/Y Intercept	3.016	1.834		1.645	.010
Distribution channels	.640	.210	.574	3.047	.005
Demand planning	.615	.236	.560	2.605	.014

Performance = 3.016 + 0.640 (distribution channel) + 0.615 (demand planning)

Therefore, holding all variables at a constant zero, performance of dairy farms in Kiambu County would be at 3.016. A unit increase in distribution channel would cause increase in firm

performance by a unit of 0.640, a unit increase in demand planning would cause increase in firm performance by a unit of 0.615. The t statistics show that distribution channel have the greatest effect on firm performance (t=3.047), followed by demand planning (t=2.605). Findings support Mwangi (2019) that supply chain optimization significantly predict firm performance, Owino (2015) that use of integration in the supply chain is significantly related to performance, and Korir, Bonuke, and Chepkwony (2017) that supply chain operational capabilities have a positive and significant effect on firm performance

Conclusion

The distribution of the milk products affects performance of the firms. A good transport system allows on-time delivery of raw materials to the organization and products to the customers. Vehicle scheduling enables reduction of operational costs and the firms' distribution plans offers flexibility to respond to customers' demand. Transport infrastructure and processes are adequate and reliable. However, there are a few distribution centres and warehouses countrywide. Material management enhances firm performance.

Demand planning helps to predict future demands of products. This ensures that there is no shortage when demand is high and also the firm does not experience wastage incase of low demand. Demand planning enables the firms to make more sales when the demand is high hence improved performance. The firms do not carry out market research. They hence lack scientific statistics on the current and future market demands.

Recommendations

Based on the study findings, the study recommends that;

The dairy firms should automate the ordering process to increase accuracy and efficiency of order deliveries. The automation of the ordering process will help distributors to make their orders at their own convenience.

The dairy firms should offer reasonable prices to the milk producers and a fair share in consumers‟ currency. Offering reasonable price per litre can inspire dairy farmers to sell milk through the formal channel (plants). The farmers should be encouraged to form farmers‟ groups/organizations such as cooperatives that can possibly amplify their bargaining power through collective mechanism. Collective bargaining mechanism can make associations being able to increase negotiation power in setting price. The dairy firms should also try to have more distribution agents and warehouses in various shopping centres countywide. This will ensure that the dairy products reach out to many customers hence increasing the sales and profitability.

Dairy Companies should increase their resource commitment to staff training and research and Development in materials management so as to develop the necessary skills, update their knowledge, and enhance New Product Development to meet customers' demand. The firms need to ensure that they have a balanced production where they meet customer demand without overproducing and wasting valuable resources. Overproducing directly translates into losing money while underproducing also comes with a price (other than opportunity loss). Failure to deliver puts a firms' reputation at risk.

Areas for Further Study

This study focused on dairy firms in Kiambu County. A similar study should be conducted in dairy firms in other counties in Kenya.

A similar study should be conducted to investigate other factors which affect firm performance since the study shows that the variables under study contribute to 637% of firm performance hence to study other 36.3% variables that affect performance of dairy firms.

REFERENCES

Berut, Z. J. (2020). *Influence of Supply Chain Collaboration on Performance of Dairy Processing Firms in Kenya*. Unpublished Masters' Thesis, Jomo Kenyatta University of Science and Technology.

Chugi, S. K. (2022). *Distribution Network Economy and Logistics Performance of Fresh Milk Processing Firms in Kenya*. Unpublished Masters' Thesis, University of Nairobi.

Ding, H., Fu, Y., Zheng, L., & Yan, Z. (2019). Determinants of the competitive advantage of dairy supply chains: Evidence from the Chinese dairy industry. *International Journal of Production Economics*, *209*, 360-373.

Garcia, D. J., & You, F. (2015). Supply chain design and optimization: Challenges and opportunities. *Computers & Chemical Engineering*, 81, 153-170

Jia, X., Chowdhury, M., Prayag, G., & Chowdhury, M. M. H. (2020). The role of social capital on proactive and reactive resilience of organizations post-disaster. *International Journal of Disaster Risk Reduction*, 48, 101614

Joto, B. M. (2018). *Effect of logistics outsourcing on the performance of dairy processing firms in Kenya* . Unpublished Masters' Thesis, University of Nairobi.

Kavilal, E., Venkatesan, S. P., & Kumar, K. H. (2017). An integrated fuzzy approach for prioritizing supply chain complexity drivers of an Indian mining equipment manufacturer. *Resources Policy*, 51, 204-218

Khayyat, M. (2015). *An Intelligent Multi-Agent Based Model for Collaborative Logistics Planning*. Unpublished Masters' Thesis, University of Nairobi.Concordia University.

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

Korir, L., Bonuke, R. & Chepkwony, J. (2017). Effect of Supply Chain Operational Capabilities and Firm Performance in State Corporations in Kenya. *International Journal of Economics, Commerce and Management*, United Kingdom, 5(8)612-630

Kuma, B. (2019). *Market access and value chain analysis of dairy industry in Ethiopia: The case of Wolaita Zone* . Unpublished PhD Dissertation, Haramaya University.

Liu, W. & Yan, X. (2020). Effect of buyer-supplier supply chain strategic collaboration on operating performance: evidence from Chinese companies. *An International Journal of Supply Chain Management*, 10(11) 4-30

Mahmood, H. (2015). Public Procurement and Corruption Confronting organization and the Challenges and Opportunities; *Management Journal of Social Sciences and Procurement*, 12(10), 23-29.

Moazzam, M., Akhtar, P., Garnevska, E., & Marr, N. E. (2018). Measuring agri-food supply chain performance and risk through a new analytical framework: a case study of New Zealand dairy. *Production Planning & Control*, *29*(15), 1258-1274.

Mor, R. S., Singh, S., & Bhardwaj, A. (2017). Exploring the causes of low-productivity in dairy supply chain using AHP. *Jurnal Teknik Industri*, *19*(2), 83-92.

Mwangi, W. (2019). *Influence of Supply Chain Optimization on the Performance of Manufacturing Firms in Kenya*. Unpublished PhD Dissertation, Jomo Kenyatta University of Agriculture and Technology

Ndiwa, B. M. (2022). *Inventory management practices and supply chain performance of dairy processing firms in Kiambu county, Kenya.* Unpublished Masters' Thesis, Kenyatta University

Oballah, D., Waiganjo, E., Wachiuri, E. W (2015). Effect of Inventory Management Practices on Organizational Performance in Public Health Institutions in Kenya: A Case study of

Kenyatta National Hospital. Nairobi. *International Journal of Education and Research*, 3(3)

Owino, D. (2015). *Supply Chain Integration and Organizational Performance of Commercial Banks in Kenya*. Unpublished Masters Thesis, University of Nairobi

Prakash, S., Soni, G., Rathore, A. P. S., & Singh, S. (2017). Risk analysis and mitigation for perishable food supply chain: a case of dairy industry. *Benchmarking: An International Journal*

Sadraoui, T. & Mchirgui, N. (2017). Supply Chain Management Optimization within Information System Development. *International Journal of Econometrics and Financial Management*, 2(20) 59-71.

Susanty, A., Bakhtiar, A., Jie, F., & Muthi, M. (2017). The empirical model of trust, loyalty, and business performance of the dairy milk supply chain: A comparative study. *British Food Journal*.

Tanveer, M. I., Shahid, U. H., & Zafar , S. A. (2022). Impact of Material Management on Performance of Textile Manufacturing Firms in Pakistan. *African Journal of Emerging Issues*, 4(9), 1 – 11

Vipulesh, S. (2015). Impact of Inventory Management on the Financial Performance of the firm. *IOSR Journal of Business and Management*, 17(4): 01-12.

Wang, S.-C., Tsai, Y.-T., & Ciou, Y.-S. (2020). A hybrid big data analytical approach for analyzing customer patterns through an integrated supply chain network. *Journal of Industrial Information Integration*, 20,100177