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AN ASSESSMENT OF THE EFFECT OF LOGISTICS MANAGEMENT PRACTICES ON OPERATIONAL EFFICIENCY AT MUMIAS SUGAR COMPANY LIMITED, KENYA

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Abstract

Sugar processing industries have in the recent past suffered continuous losses arising from mainly operational challenges attributed to poor planning of logistics management practices. The objective of this study was to assess logistics management practices on operational efficiency of Mumias Sugar Company Limited, Kenya. The target population for the study included staff from selected departments of Mumias Sugar Company, representatives of farmers, and officials from the Ministry of Agriculture and the Kenya Sugar board. Stratified sampling technique was used to select the predetermined sample size of 92. Purposive and convenience sampling methods were used to select sample elements for interviews. Data was analyzed using mean, standard deviation and inferentially through correlation and regression analysis. The study revealed that effective management of information flow improves the company's internal and external processes. Automation of warehousing activities greatly enhances accuracy, speed of operations and reduces wastage. Transport management and physical distribution practices on the other hand allows faster and cost effective flow of goods and raw materials thus improving operational efficiency The study recommends a strategic approach to logistics management practices through embracing modern technology and employee training.

Keywords: Information flow, Warehousing, Logistics, Distribution, Transport Management

INTRODUCTION

Council of Logistics Management (1991) defined logistics as part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements. Logistics system is made up of logistics services, information systems and infrastructure/resources. Logistics services is made up of activities such as warehousing and transportation that support the movement of materials and products from point of origin to point of consumption, and vice versa. Information systems include modeling and management of decision making, and more important issues are tracking and tracing. On the other hand, infrastructure comprises human resources, financial resources, packaging materials, warehouses, transport and communications (BTRE, 2001).

Logistics, previously viewed as a classical function, which involves adversarial relationships among suppliers, customers and transportation providers, is emerging as a key source of competitive advantage and a leading reason for strategic alliance relationship between companies and their logistics providers (Hai & Yirong, 2002). A logistical system is made up of a large number of stakeholders. They include the suppliers, manufacturers, wholesalers or distributors and retailers who have to be managed strategically in order to deliver final products in the right quantities at the desired time and quality at the right place and at a reasonable cost to the final consumers. Logistics strategy has three main objectives; cost reduction, capital reduction and service improvement. In the last two decades, product flow has been greatly improved due to better technology in communication and transportation. Increased variety of goods, globalization of marketing and seasonal variations are among the major challenges of logistics system which leads to the necessity of developing effective logistics strategies in the agricultural sector (Gebresenbet & Bosona, 2012). Fresh agricultural products logistics requires robust, fast, sensitive and reliable logistics management information network and market supply and demand information (Liu & Ke, 2012).

Sugar Industry in Kenya

Economically, the sugar industry provides a superb multiplier of economic growth. Not only does sugar consume a large number of items (example being fertilizer, fuel, spare parts, chemicals of various kinds), but it also provides business opportunities with regards to the transport of cane and sugar, merchandising and distribution opportunities. About 90% of the Sugarcane production is contributed by small scale farming while the remaining 10 % coming from large scale farmers and factory nucleus estates concentrated in the western part of the country. The sugar sub-sector is the third most important contributor to the GDP after tea and coffee. It supports directly

or indirectly 6 million Kenyans. It's a source of livelihood for about 170,000 farmers in western Kenya (Wawire et al. 2006 & Odenya et al. 2007). The industry employed about 500,000 people directly or indirectly in the sugarcane business chain from production to consumption. In addition, the industry saves Kenya in excess of USD 250 million (about KShs. 20 billion) in foreign exchange annually and contributes tax revenues to the exchequer (VAT, Corporate Tax, personal income taxes) (KSB, 2010). However, the output from this sub-sector has faced several challenges emanating from low adoption of agricultural technology, high cost of inputs and poor transport system (GOK, 2001; Wawire et al. 2006 & Odenya et al. 2007).

Currently, there are 10 active milling companies that support sugar processing in Kenya with Mumias Sugar Company being the largest, producing about 250,000 metric tonnes of sugar annually. The Company is supplied with cane from its own sugarcane estates and from registered out growers who number more than 50,000. Being an intensive venture, sugar manufacturing processes that involve cane development, sugar cane processing and packaging mainly attract major costs in factors of production such as labor and raw materials. These high costs and increased competition put companies such as Mumias Sugar Company under threat of making perpetual loses.

Statement of the Problem

Sugar is an important commodity and there are numerous challenges and opportunities that exist in Africa as a whole for this industry. Most Sub-Saharan Africa countries still heavily rely in the agricultural sector as a source of economic livelihood for most of its population. Hence, in an effort to improve the sector, various interventions have been adopted. (Miller, 2008).The Cost of producing sugar in Kenya is higher than those in other producing countries in East Africa and COMESA member states. The Kenya Sugar Industry Strategic plan (2010-2014) puts the cost of producing sugar in Kenya at 415-500USD/ton while that of Uganda and Tanzania are put at 180-190 USD/ton and 140-180USD/ton respectively. Report by The Kenya Sugar Industry Strategic plan (2010-2014) indicated the challenges such as irregular factory maintenance, low crushing capacity, low sugar extraction rates, slow adoption of new and appropriate technology, inadequate industrial research, high cost of sugar production, narrow product base, dilapidated processing equipment, inefficient factory operations and wastage in cane yard.

From 2012, Mumias Sugar Company has been experiencing low sugar output and decreased profits which have been blamed on internal inefficiencies and fall in cane supply. According to a forensic audit carried out by KPMG, the company registered a loss of up to Ksh. 1 billion in 2012. A further loss of Ksh. 2.7 billion was recorded in 2014.The challenges experienced by MSC majorly circulate around logistics management, processing, distribution and

consumption. However, there has been knowledge gap as to whether these factors can affect operational efficiency. This study therefore opted to fill this gap by assessing how logistics management practices influence the operation efficiency of Mumias Sugar Company.

Scope of the study

This study focused on Mumias Sugar Company, which provided an interesting case for analysis. Employees of Mumias Sugar Company, representatives of farmers who supply sugar cane to the company and officials in the Ministry of Agriculture and the Kenya Sugar Board were vital in providing data on the four logistics management practices; information flow, warehousing, transportation and physical distribution in assessing operational efficiency.

Research Objectives

i. To determine the effect of management of information flow on operational efficiency.
ii. To establish how warehousing management activities affect efficiency in the processing operations.
iii. To determine the effect of transportation management activities on operational efficiency.
iv. To examine the effect of physical distribution management on operational efficiency.

Justification of the Study

The recommendations of this study would enhance competiveness in the industry in order to transform it into a leaner low cost industry as improve operational efficiency hence contribute to increased profitability in the industry. The findings and recommendations of this study will be useful to the procurement professionals and operations managers in understanding logistics management practices and their contribution in operational efficiency which improves logistics management decisions.

LITERATURE REVIEW

Theoretical Review

Fugate Logistic Performance Model

The model created by Fugate et al. (2010), puts emphasis on the dimensions of efficiency, effectiveness and differentiation of logistics activities as determinants of logistics performance. Fugate et al. (2010) analyzed the relationship between logistics performance and organizational performance, stating that logistics performance is multidimensional and is a function of the resources used in logistics, according to outlined objectives and outcomes against competitors.

Conversely, Fugate et al. (2010) find firms that choose to combine efficiency and effectiveness achieve better performance than their competitors who choose only one of these dimensions, which is in line with what is stated by Seldin and Olhanger (2007).

Aramyan Model

This model, created by Aramyan et al. (2007), analyzes the supply chain of food products, using efficiency, flexibility, responsiveness and food quality as determinants of logistic performance. The Aramyan model is based on a literature review of the main methodologies for analyzing performance and contains the specific features of a food supply chain. The model structure is based on four categories of variables which, in the authors' opinion, collect specific information about that industry. Based on these dimensions, Aramyan et al. (2007) theorized a conceptual framework for evaluation of logistics performance, which suggests dividing the analysis of logistics chain performance in four categories or clusters of indicators. The first category is, efficiency which seeks to measure how resources are used. This category consists of a set of logistical process indicators, such as distribution costs, transaction or possession of stock. The second category, flexibility, indicates the ability of the Performance Measurement System to respond to changes in the environment and exceptional customer orders. The third category, called responsiveness helps to promote what the customer wants in the shortest amount of time while quality, the fourth category represents the particular characteristics of the food supply chain, such as shelf life and product safety, among others.

Empirical Literature Review

Information Flow Management

The information in a supply chain can be classified in different ways; strategic or tactical; logistical or pertaining to consumers (Mentzer, 2004). Effective inter-organizational communication could be characterized by frequent, genuine and involving personal contacts between buying and selling personnel (Krause & Ellram, 1997). Lee & Whang (2000) discuss various types of shared information and their potential benefits. For example, sharing order status can improve the quality of customer service, reduce payment cycles and reduce labor cost. On the other hand, information sharing on forecast demand of products that have high demand variability is significant in assist reduce stock out and over-stocking related costs whereas sharing information on market knowledge can help improve advertisement. While sharing information, it is important to consider the level of benefit to the users and timeliness; delayed transmission of information increases the effects of volatility afflicting the upstream level of supply chain.

There is possibility that some companies might not want to share their detail data with partners, fearing that the data could leak to their competitors (Foerstl et al, 2010). Information-enabled collaboration reduces costs across the chain while enhancing customer service and value. Unfortunately, few companies have fully harnessed information's ability to enhance SC performance (Fawcett et al, 2007).Advances in information technology have changed modern business practice, making collaborative supply chain management possible (Chatfield et al, 2004). Information's competitive value is widely heralded it substitutes for inventory, speeds new product design, shortens order fulfillment cycles, drives process reengineering, and coordinates SC activities (Hult et al., 2004).

Warehousing Management

Warehousing refers to the activities involving storage of goods on a large-scale in a systematic and orderly manner and making them available conveniently when needed. Warehousing is one of the important auxiliaries to trade. It creates time utility by bridging the time gap between production and consumption of goods. According to Lambert et al. (1998) they contribute to a multitude of the company's missions, like; Achieving transportation economies (e.g. combine shipment, full-container load), achieving production economies (e.g. make-to-stock production policy),taking advantage of quality purchase discounts and forward buys, supporting the firm's customer service policies, meeting changing market conditions and uncertainties (e.g. seasonality, demand fluctuations, competition), overcoming the time and space differences that exist between producers and customers, providing temporary storage of material to be disposed or recycled (i.e. reverse logistics).

Tompkins et al., (2003) cites the typical warehouse functional areas and flows as; receiving, staging for cross-docking, reserve, forward and shipping. Receiving, transfer and put away, order picking, cross-docking, and shipping. Order picking is the most labor-intensive and costly activity of most warehouses. Approximately 55% of the total warehouses operating expenses are related to order-picking operations (Bartholdi & Hackman, 2011). According to De Koster (2004), the most common order picking system is picker-to-parts systems, in which the order pickers walks or drives along the aisle to pick items.

Warehouse layout is also important in achieve greater efficiencies. Minimizing travel time between picking locations can greatly improve productivity. However, to achieve this increase in efficiency, companies must develop processes to regularly monitor picking travel times and storage locations. Warehouse layout is one important factor affecting the order picking process. Caron et al, 2000 find that the warehouse layout has a considerable effect on order picking travel distance. They point out the layout design has an effect of more than 60% on the total travel

distance, and also find the relationship between warehouse layout and order picking travel distance(Bartholdi & Hackman, 2011). Warehouse operations that still use hard copy pick tickets find that it is not very efficient and prone to human errors. To combat this and to maximize efficiency, world class warehouse operations have adopted hand-held RF readers and printers. Companies are also introducing pick-to-light and voice recognition technology (Tsige, 2013).

Physical Distribution

Physical distribution is a whole process that concern also materials and finished product, a physical (spacial) movement of goods from the manufacturers to intermediaries and finally to the ultimate consumer. Distribution accomplishes this by providing time and place utility, in other words, availability and its goals are like any other marketing goals: consumer's satisfaction and profit for the firms (Muhscina, 2008). There are various routes that products or services use after their production until they are purchased and used by end users. These channels are referred to as distribution channels or marketing channels. Therefore, distribution channels are all those organizations that a product has to go through between its production and consumption (Kotler et al, 2006). Distribution channel management is very critical for the firms when they decide to enter one or more markets. In accordance with Gattorna and Walters (1996), depict that distribution channel management follows a structured approach, using criteria which help to evaluate optional channel structures during which alignments, trade-offs and channel relationships are considered. Increasingly, the roles of logistics service firms are included in the decision process for distribution channel, especially when they are a dominant element within the supply chain. Figure 1 below represents the most common distribution channels for consumer goods.

Figure 1: Major Channels of Distribution

Source: Etzel et al. (2004)

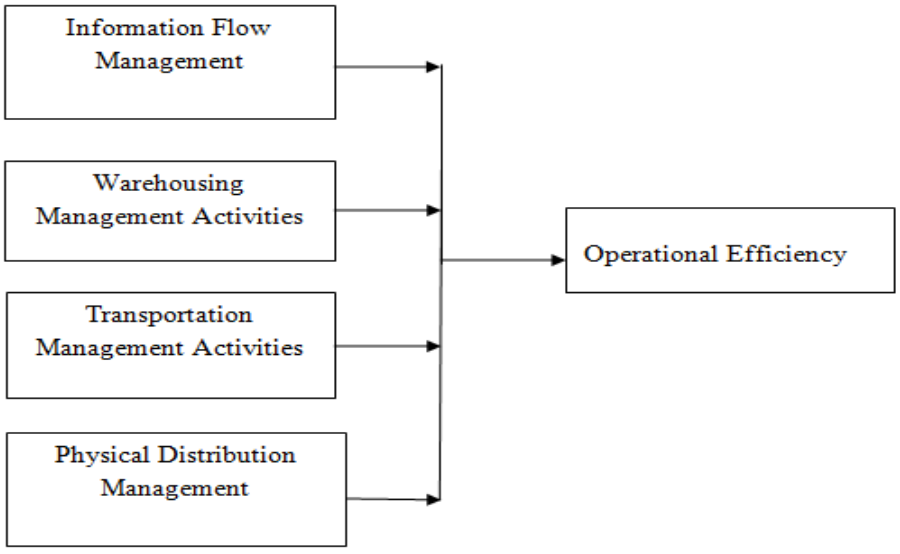
There are 3 degrees of intensity of distribution namely; selective, intensive and exclusive distributions with their application relying on the nature of the product and market type (Etzel et al, 2004).

Transportation management

Transportation can be defined as the act of moving goods or people from an origin to a required destination. It also includes the creation of time and place utilities. Transportation plays a key role in the supply chain, because without the efficient movement of finished goods and raw materials the entire system would not be able to work at its full potential (Randall et al., 2010). According to the investigation of National Council of Physical Distribution Management in 1982, the cost of transportation, on average, accounted for 6.5% of market revenue.

The modes of transportation can be divided into five: rail, road, air, water and pipeline. Intermodal freight transport involves the transportation of freight in an intermodal container or vehicle, using multiple modes of transportation (rail, ship, air, water and truck), without any handling of the freight itself when changing modes. The method reduces cargo handling, and so improves security, reduces damages and losses, and allows freight to be transported faster (Cavinato et al., 2007).The goal for any business owner is to minimize transportation costs while also meeting demand for products. Transportation costs generally depend upon the distance between the source and the destination, the means of transportation chosen, and the size and quantity of the product to be shipped. In many cases, there are several sources and many destinations for the same product, which adds a significant level of complexity to the problem of minimizing transportation costs (Lambert, 2004).

Figure 2. Conceptual Framework



RESEARCH METHODOLOGY

Research Design

Thornhill et. al (2003) defined a research design as a general plan on how the researcher plans to answer the research question..The researcher adopted a cross sectional descriptive design approach. Correlational approach was used to establish how logistics management activities affect operational efficiency.

Population

Population is defined by Mugenda & Mugenda (2003) as the set of individuals, cases or objects under study with some common observable characteristics. The population for this study comprised of employees of Mumias sugar factory from all departments and levels of management, sugar cane farmers' representatives within MSC belt and officials from Ministry of Agriculture, Kakamega County.

Sample Size and Sampling Techniques

In studying the population, the sample is sufficient if it is representative of the population or has the same characteristics as the population (Zikmund, 2003). Simple stratified random sampling was then used to select samples from the population strata. This technique was employed since it eases the making of proportionate samples, and therefore meaningful, comparisons between homogeneous sub-groups. Convenience and purposive sampling methods were used to select sample elements for interviews. Yamane (1967)'s formula was used to determine the sample size of 92 which was distributed as represented in Table 1.

Table 1: Sample Distribution

Cluster Department	Population	Sample	Proportion
Information Technology	6	4	4%
Warehousing	8	6	7%
Distribution	16	13	14%
Transport	20	16	17%
Counties			
Kakamega	36	28	30%
Bungoma	12	9	10%
Busia	20	16	17%
TOTAL	**118**	**92**	**100%**

Data Collection Procedures

The study embraced both quantitative and qualitative approaches in collecting both primary and secondary data. According to Silverrman (2001), quantification gives greater confidence in the accuracy of conclusions derived from qualitative data; and it gives the reader a chance to think through the data on their own to cap on the researcher's findings.

Primary data was collected by use of questionnaires and interviews. The questionnaires had both open ended and closed ended questions and were administered using drop and then pick later method. While secondary data was obtained from policy documents and publications from Kenya Sugar Board, Kenya National Bureau of Statistics, Ministry of Agriculture and farmers association.

Data Processing and Analysis

Data was collected in quantitative form and analysis carried out depending on each specific objective. Quantitative data was mainly obtained from questionairres through the closed ended questions and interviews results. The responses from open-ended questions were coded before analysis.

Data analysis was done using; mean standard deviation, correlation analysis and regression analysis. For ease of analysis, procedures within Statistical Package for Social Sciences (SPSS) version 21 wasused. Responses from the conducted interviews were used to reinforce these findings.

ANALYSIS AND FINDINGS

The research targeted 92 respondents of which 86 filled returned their questionnaires resulting to a 93% response rate. The rate is satisfactory according to the argument of Cooper and Schindler (2003) that sets a response rate of 30% to 80% as adequate.

Demographic Information

The researcher sought background information of respondents in terms of gender, age, education level, source of livelihood and experience. The results were as shown in the Table 2 and 3.

Table 2 reveals that 27 (57.4 %) of the farmers representatives were males while 20 (42.6 %) were females. This implies that majority of the farmers representatives are males. Most farmers, 24 (51.1 %), were aged between 36 and 50 years and majority, 27(57.4%), had tertiary education. Most of the respondents, 26(55.3%), were self-employed.

Table 2: Findings on Background Information of Farmers Representatives

		Frequency	Percent
Gender	Male	27	57.4
	Female	20	42.6
	Total	47	100.0
Age of Farmers' Representatives	18-35 Years	6	12.8
	36 - 50 Years	24	51.1
	50 plus years	17	36.2
	Total	47	100.0
Education	Primary	4	8.5
	Secondary	16	34.0
	Tertiary	27	57.4
	Total	47	100.0
Source of Livelihood	Formal Employment	21	44.7
	Self-Employment	26	55.3
	Total	47	100.0

Table 3: Findings on Sugar Cane Farming

		Frequency	Percent
Supply Canes to	Mumias Sugar Company	26	55.3
	Other Companies	21	44.7
	Total	47	100.0
Size if Land on Cane	Less than 1 acre	21	44.7
	1-3 acres	15	31.9
	Above three acres	11	23.4
	Total	47	100.0
Type of Sponsorship	Private	25	53.2
	Company Sponsored	22	46.8
	Total	47	100.0
Average Income per Year	Less than KShs. 100,000	14	29.8
	KShs. 100,000 - 500,000	15	31.9
	KShs. 500,000 and above	18	38.3
	Total	47	100.0

From Table 3, it is evident that majority, 26(55.3%),of farmers supply sugar cane to Mumias Sugar Company. 21 (44.7 %) of the respondents had farms less than one acre on sugar cane while 11 (23.4 %) had more than 3 acres dedicated to cane. Majority, 25(53.2%), of the farmers were privately sponsored while only 14 (29.8 %) of the farmers had income per year of less than

KShs. 100,000 per year. This implies that income distribution was evenly distributed among farmers.

Table 4: Background Information of Employees

		Frequency	Percent
Gender	Male	22	56.4
	Female	17	43.6
	Total	39	100.0
Age	18-35 Years	11	28.2
	36 - 50 Years	16	41.0
	50 plus years	12	30.8
	Total	39	100.0
Education	Primary	5	12.8
	Secondary	10	25.6
	Tertiary	24	61.5
	Total	39	100.0
Experience	0 – 3 years	9	23.1
	4 – 6 years	15	38.5
	12-18 Months	9	23.1
	7 – 10 years	6	15.4
	Total	39	100.0

From Table 4, it is clear that majority, 22(56.4%), of employees in Mumias Sugar Company are males. Only 11(28.2 %) of the employees were aged between 18-35 years as most, 16 (41.0 %), were aged between 36 - 50 years while 12 (30.8 %) were aged 50 plus years. Similarly, the results revealed that minority, 9 (12.8 %), of the respondents had primary education.

Information Flow Management

Mumias Sugar Employees

Table 5: Responses on information flow management

Features of information flow management	N	Min	Max	Mean	Std. Dev
The company frequently communicates with its suppliers	39	1	5	3.54	.942
Interdepartmental communication is effective	39	1	5	3.51	.942
There is good information sharing with non-competing firms	39	3	5	3.82	.683
Modern technology is employed in information sharing	39	2	5	3.67	.838
Information sharing assists improve company's processes	39	3	5	3.79	.695
The company carries out frequent advertising	39	2	5	3.64	.873

The researcher was interested in the company's flow of information, especially to and from suppliers. From Table 5, the mean of 3.54 with standard deviation of 0.942 indicates that the company frequently communicates with its suppliers. The company has moderately effective interdepartmental communication as evidenced by mean of 3.51 and standard deviation of 0.942. The company to a large extent shares information with non-competing firms as indicated by a mean of 3.82 and standard deviation of 0.683. The mean of 3.67 with standard deviation of 0.838 reveal that the organization uses modern technology in information sharing. Lastly, the mean of 3.64 with standard deviation of 0.873 reveal that Mumias Sugar Company averagely advertises. It is evident from these findings that Mumias Sugar Company frequently communicates with its supplier as well as has in place effective interdepartmental communication systems. Information sharing has improved the company's internal processes.

Farmers' Representatives

Table 6: Findings on information aspects

Aspect	N	Min	Max	Mean	Std. Dev.
Factory maintenance practices	47	2	4	3.83	.842
Transportation of harvested cane	47	2	4	3.79	.832
Provision of farm inputs (fertilizer & seeds)	47	2	4	3.89	.814
Changes in markets trends/policies within the sugar industry	47	2	4	3.87	.769
General Performance of the company	47	1	4	3.70	.832

The study sought to find the extent to which the respondents agreed with the below statements on flow of information. From Table 6, the mean of 3.83 and standard deviation of 0.842 reveal that the respondents pointed out that the company provides information on factory maintenance practices, the mean of 3.79 with standard deviation of 0.832 reveals that on average, Mumias Sugar Company provides information on harvested canes while the mean of 3.89 and standard deviation of 0.814 reveal that the company provides information on farm inputs. Similarly, the mean of 3.87 with standard deviation of 0.769 for provision of information on changes in markets trends/policies within the sugar industry and mean of 3.70 and standard deviation of 0.832 for provision of information on general performance of the company reveal that the respondents are generally satisfied that the company provides information on changes in markets trends/policies within the sugar industry and general performance of the company. From the these results, it is evident that Mumias Sugar Company provides information on factory maintenance practices, on harvested canes, farm inputs changes in markets trends/policies within the sugar industry and

general performance of the company. Such information is critical in planning internal operations of farmers as far as planting, managing farms and harvesting of canes is concerned.

Warehouse Management

Table 7: Results on Aspects of Warehousing Management

Warehouse Aspects	N	Min	Max	Mean	Std. Dev
There are enough warehouses	39	2	5	3.82	.683
Shutting down of the factory does not affect sugar supply	39	2	5	3.04	.682
Most warehousing activities are automated	39	3	5	3.92	.703
Warehousing activities have improved efficiency	39	3	5	3.85	.630

The respondents were requested to indicate opinion on their relationship with Mumias Sugar Company on dimensions of supplier company relationship. From Table 7, a mean of 3.82 and standard deviation of 0.683 indicates that the company has enough warehouses. The mean of 3.04with standard deviation of 0.682 reveal that respondents were generally not sure if the closure of the company would influence sugar supply. The mean of 3.92 and standard deviation of 0.703 indicate that to a large extent, the company has automated most of its warehousing activities. Lastly, the mean of 3.85 and standard deviation of 0.630 indicate that automation of warehousing warehouse activities have improved efficiency in warehouse operations. Automation enhances accuracy, reduces wastages and enhances speed of operations thereby improving warehouse efficiency. Adequate storage facilities with modern handling tools are necessary to ensure continuous supply of raw materials and correct handling of stored materials. It also ensures guarantee in quality.

Transportation and Harvesting of cane

Mumias Sugar Employees

Table 8: Findings on aspects of transportation

Transport Aspects	N	Min	Max	Mean	Std. Dev
Transportation directly affects productivity	39	3	5	4.08	.703
There are sufficient transportation units	39	3	5	3.92	.623
Current vehicle scheduling practices has improved cane transportation	39	1	4	3.18	.885

The researcher sought respondents' opinion on their level of agreement with various transport aspects. From Table 8, it was evident that most employees agree that transportation affects productivity (mean 4.08, standard deviation.703). The mean of 3.92 with standard deviation of 0.623 reveals that there are sufficient transportation units in the company while a mean of 3.18 with standard deviation of 0.885 reveal that respondents were generally unsure if the current vehicle scheduling practices has improved cane transportation. Transportation and transportation scheduling are key aspects in meeting materials need of the organizations and ensuring quality raw materials reach the company and quality products reach market in time.

Farmers' Representatives

Table 9: Time taken to harvest and transport canes

		Frequency	Percent
Time to Harvest	Less than 18	6	12.8
	18 months	25	53.2
	Above 18 months	16	34.0
	Total	47	100.0
Time to transport	Less than 1day	10	19.2
	Between 1-2 days	5	10.6
	Between 2- 4 days	15	31.9
	Above 4 days	17	36.2
	Total	47	100.0

The researcher sought to find out how long it takes to harvest and transport canes from the farms. The results were summarized as in Table 9 above.6 (12.8 %) of the respondents pointed out that it takes less than 18 months to harvest canes, 25 (53.2 %) pointed out that it takes 18 months while 16 (34 %) pointed that it takes more than 18 months to harvest. On time it takes to transport harvested canes from farms, 10 (19.2 %) of the respondents pointed out that it takes less than one day to collect harvested canes from farms, 5 (10.6 %) pointed out that it takes between 1 and 2 days, 15 (31.9 %) pointed out that it takes between 2 and 4 days while 17 (36.2 %) pointed out that it takes more than 4 days to collect harvested canes. It implies that the time it takes to collect harvested canes from farms varies. This could be attributed to changes in route scheduling of tracks and changes in weather conditions.

Physical Distribution

Majority of the respondents indicated that the channel mostly employed by MSC in the distribution of sugar is;

Manufacturer ⟶ Wholesaler ⟶ Retailer ⟶ Consumer

However a few others mentioned that sugar is sometimes directly supplied to retailers or consumers. On the other hand, more than two thirds of the respondents (30, 77%) agreed that the current distribution channels reduce lead time. The results were presented in Table 10.

Table 10: Effect of Physical Distribution on Lead Time

	Frequency	Percent
Yes	30	76.92
No	9	23.08
Total	39	100.0

Operational Efficiency

Aspects of Operational Efficiency

Table 11: Level of Operational Efficiency Achieved

Achievements	N	Min	Max	Mean	Std. Dev
Improvement in product and process quality	39	2	5	3.74	.880
Cost savings in production and distribution	39	2	5	3.79	.864
Increase in sales of products	39	2	5	3.82	.885
Increase in market share	39	2	5	3.90	.754
Increase in organizational profits	39	2	5	3.82	.790

The respondents were also requested to express their opinions on the achievements of the company as a result of the current logistics management practices. The findings were as shown in Table 11. The mean of 3.74 and standard deviation of 0.88 indicated that product and process quality has generally improved as a result of the current logistics management practices. The mean of 3.79 and standard deviation of 0.864 reveal that Mumias Sugar Company is experiencing reduced production and distribution costs as a result of the current logistics management practices. The company is experiencing increased sales as a result of its current logistics management practices. Similarly, Mumias Sugar Company is experiencing increased

market share and organizational profits as indicated by mean of 3.90 with standard deviation of 0.754 and mean of 3.82 with standard deviation of 0.790 respectively.

Effects of Quality of Services

Table 12: Findings on Effects of Quality of Services offered by Mumias Sugar Company

Services	N	Min	Max	Mean	Std. Dev
Payment for cane delivered to the company	47	1	3	2.81	.680
Period before the cane is cut	47	1	3	2.77	.698
Transportation of cane from the farms	47	1	3	2.64	.845
Information flow to and from the factory	47	1	3	2.47	.654
Availability of sugar in the market	47	1	3	2.83	.601

The research sought to find out the level of effect of quality of various services offered by the company. From the summary of findings in Table 12, the mean of 3.81 and standard deviation of 0.680 reveal that that are remarkably affected by payment for cane delivered to the company. Farmers depend on funds from the company to carry out their operations and are likely to be affected when payment is either delayed or is inconsistent. The mean of 3.77with standard deviation of 0.698 indicate the farmers are averagely affected by time it takes to cut the mature canes. Similarly, transportation of cane from the farms and information flow to and from the factory evidently affect farmers operations as indicated by means of 3.47 and 3.83 respectively. Transportation time and information flow are important aspects to farmers as they allow farmers plan operations.

Services offered to farmers

Table 13: Services offered to farmers by Mumias Sugar Company

Services	N	Min	Max	Mean	Std. Dev.
Supply of farming input e.g.fertilizer and seeds	47	1	5	3.49	.906
Picking of cut cane from the farms	47	1	5	3.47	.905
Agricultural extension services	47	2	5	3.77	.729
Recording of farmers' cane supplies	47	1	5	3.62	.898
Maintenance of accurate farmers records	47	3	5	3.87	.711

Respondents were asked whether they were satisfied with supply farming inputs offered by Mumias Sugar Company. In Table 13, the mean of 3.49 reveal that on average, the respondents

are moderately satisfied with supply of farm inputs offered by Mumias Sugar Company. The standard deviation of 0.906 reveals that the responses were diverse indicating the not all farmers were moderately satisfies. Some were less satisfied while others were more satisfied. As to whether the farmers were satisfied with picking of cut canes, a mean of 3.47 indicate that the picking services had average satisfaction as farmers are concerned. Standard deviation of 0.905 reveals a lot of divergence in farmers' level of satisfaction. This implies that the picking services offered by Mumias Sugar Company are average and may need some improvement. The mean of 3.77 and standard deviation of 0.729 reveal that on average, farmers are satisfied with agricultural extension services offered by Mumias Sugar Company. Similarly, the mean of 3.87 with standard deviation of 0.711 reveal that farmers are generally confident that Mumias Sugar Company maintains accurate farmers' records. From these results, it can be seen that Mumias Sugar Company offers satisfactory services to farmers as far as provision of farm inputs is concerned. The company offers satisfactory agricultural extension services to farmers and maintains accurate records on farmers. These services are critical in successful operation of any supplier. Farmers specifically need these services to meet the materials needs of the sugar processing companies.

INFERENTIAL ANALYSIS

Correlation Analysis

Correlation analysis was conducted to establish the effects of Warehousing Management, Transport Management and Information Management on Operational Efficiency. The results were as presented in Table 14.

Table 14: Correlation Analysis

		Warehousing Management	Transport Management	Information Management	Physical Distribution	Operational Efficiency
Operational Efficiency	Pearson Correlation	.588	.682	.611	.36	1
	Sig. (1-tailed)	.022	.035	.047	.10	
	N	39	39	39	39	39

The Pearson Correlation values of 0.588, 0.682, 0.611 and 0.360 indicate a positive correlation which implies that warehousing, Transport, Information flow and physical Distribution management positively correlate with operational efficiency. The relationship is however weak with physical distribution. The research also revealed a statistically significant relationship exists between operational efficiency and three of the logistics management practices; Warehouse

management, p=0.022 (<0.05), Transport management, p=0.035 (<0.05) and Information flow management, p=0.047 (<0.05). All the same, the results indicated a non-significant relationship between operational efficiency and Physical distribution, p=0.1 (>0.05).

Regression Analysis

To determine the overall effect of Warehousing Management, Transport Management, Information Management and Physical distribution management on Operational Efficiency, a multiple regression analysis was conducted.

Table 15: Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.843[a]	.710	.56	.837

a. Predictors: (Constant), Warehousing Management, Transport Management, Information Management, Physical Distribution Management

The value of R square (0.71) reveals that Warehousing, Transport, Information, Physical Distribution Management activities collectively affect operational efficiency (dependent variable) up to 71 %.

Table 16: Table of Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.163	.919		3.442	.001
	Information	.047	.163	.042	.285	.047
	Warehousing	.097	.192	.076	.507	.015
	Transport	.023	.186	.018	.121	.028
	Physical Distribution	.025	.243	.017	.103	.919

a. Dependent Variable: operational efficiency

From the table the regression model of the study can be generated as:

$$\mathbf{Y = 3.163+0.047X_1 + 0.097X_2 + 0.023X_3+0.025X_4}$$

Where; **Y** - Operational Efficiency;$\mathbf{X_1}$- Information Management; $\mathbf{X_2}$ -Warehousing Management; $\mathbf{X_3}$- Transport Management and $\mathbf{X_4}$- Physical Distribution Management.

The result indicates that setting all independent variables at zero, then a unit increase in Information Management, leads to 0.047increase in Operational Efficiency, whereas a unit increase in Warehousing Management leads to 0.097 increase in Operational Efficiency. At the same zero value, a unit increase in Transport Management and Physical Distribution Management results to 0.023and 0.025 increase in Operational Efficiency respectively. This portrays that warehousing has the largest effect on Operational Efficiency. At 5% level of significance, Information flow, Warehousing and Transport Management activities are significant in determining the relationship between logistics management practices and Operational Efficiency since their respective p-values are less than 0.05. This implies that the null hypotheses are false and are to be rejected. At the same level of significance, physical distribution is not significant in explaining the relationship between logistics management practices and Operational Efficiency. The null hypothesis was not rejected.

RECOMMENDATIONS

Internal structure and systems that allow free and timely flow of information between individuals and departments should be put in place. This will allow real time flow of information between the organization and key stakeholders. Sugar processing firms must also have adequate storage facilities with modern materials handling equipment. Employees must be involved and constantly trained on the use of these modern tools and machines so as to improve the speed and efficiency of operations. Adequate fleet and modern tracking systems must be implemented to aid in scheduling of transportation operations. The fleet must be managed and employees trained on best practices so as to avoid wastages and failures in the system. Since physical distribution of finished products is essential if an organization is to realize its full potential and achieve customer satisfaction, a channel that enables faster distribution of goods and at lower cost should be put in place.

FURTHER STUDIES

Further studies should be done on other aspects of supply chain management other than logistics management and how these factors can affect operational efficiency. Further studies could also be done to relate logistics with other aspects of organizational performance such as environmental and social performance.

REFERENCES

Aramyan, L. H. Alfons, G.J.M. Oude, L, Vorst, J. &Kooten, O. (2007).*Performance measurement in agri-food supply chains:* A case study. Supply Chain Management**:** An International Journal 12: 304-315.

Bartholdi, J. J., & Hackman, S. T. (2011).*Warehouse & Distribution Science Release*.

BTRE (2001).Logistics in Australia*: A Preliminary Analysis. Bureau of Transport and Regional Economics*,Canberra. Retrieved from http://www.btre.gov.au/docs/wp49_contents.htm.

Council of Logistics Management, (1991) *Definition of Logistics*- Accessed on 30.8.2014 Retrieved from https://www.cscmp.org/

Cachon, G.P. & Fisher, M. (2000), "*Supply chain inventory management and value of shared information*", Management Science.

Chatfield et al. (2004), "*The bullwhip effect: impact of stochastic lead time, information quality, and information sharing*: *a simulation study",* Production & Operations Management.

Cavinato, J. L.; A. E. Flynn& R. G. Kauffman.(2007)*The Supply Management Handbook*. 7th ed. Burr Ridge, IL: McGraw-Hill/Irwin.

Cook, L.S. &Heiser, D.R. (2011). The moderating effect of supply chain role on the relationship between supply Chain practices and performance, *International Journal of Physical Distribution& Logistics Management, 15-30*

Cooper, F., and Schindler H. (2004). Business Research Methods. New Delhi: Tata McGraw-Hill Publishing Company.

Coyle, J.J.,Langley& C.J. Jr. (2003).*The management of business logistic: A supply chain perspective*, (7th ed.). Cincinnati, Ohio: South-Western/Thomson Learning.

DrMwanaongoro,S. &Eng.Imbambi,R,(2014) Assessment of relationship between plant and equipment maintenance strategies and factory performance of the Kenya sugar firms. *Asian Journal of Basic and Applied Sciences* 1(2), 1-11

Etzel, Walker & Stanton (2004). *Channel of distribution* Marketing 13th Ed, Boston, and McGraw-Hill/Irwin, New Delhi

Fawcett E.S, Ostehaus.P, Magnan .G.M, Brau C.J & McCarter (2007) Information sharing and Supply chain performance: the role of connectivity and willingness; *Supply chain Management: An international Journal.12(5) 358-368*

Fugate, B. S., Mentzer, J. T. & Stank, T. P. (2010). Logistics Performance: Efficiency, Effectiveness, and Differentiation. *Journal of Business Logistics31: 43-61.*

Gattorna, J. L., & Walters, D. W. (1996*). Managing the supply chain: A strategic Perspective Distribution channel design and management*. Basingstoke, Macmillan

Gebresenbet, G.&Techane (2012)*Logistics and supply chains in Agriculture and Food. Pathways to supply Chain Excellence,* Dr.AlesGronik (Ed.),

George, D., &Mallery, P. (2003).*SPSS for Windows step by step: A simple guide and reference.*11.0 update (4thed.). Boston

Gimenez, C. & Ventura, E.(2001). *Logistics production, logistics marketing and external integration: their impact on performance*, JEL codes: L290, L660, C120, C490

Green, K.W., Whitten, D. &Imman, R.A. (2008). The Impact of Logistics Performance on Organizational Performance in a Supply Chain Context.*Supply Chain Management: An International Journal*13: 317-327.

Hai, L. &Yirong, S. (2002).*An approach towards overall supply chain efficiency- a future oriented solution and Analysis in inbound process*, School of Economics and Commercial Law Göteborg University.11-15

Heragu, S. S., Du, L., Mantel, R. J., &Schuur, P. C. (2005). Mathematical model for warehouse design and product allocation. *International Journal of Production Research, 43*(2), 327-338.

Hult, G.T.M., Ketchen, D.J. Jr &Slater, S.F. (2004),Information processing, knowledge development, and strategic supply chain performance", *Academy of Management Journal,*47 (2), 241-254.

Jap, S.D. & Mohr, J.J. (2002), "*Knowledge management: philosophy, processes, and pitfalls",*California Management Review

Joppe, M. (2000*) The research process*. Accessed on 20.3.2015 Retrieved from http://www.ryerson.ca~mjoppe/rp.htm

Kariuki P (2014) Kenya sugar industry strategic plan 2010-2014; Sugar sub-sector (challenges and opportunities) Accessed on 17.1.2015 Retrieved from http://www.kenyasugar.co.ke/downloads/KSI%20Strategic%20plan.pdf

Kotler, P.; Wong, Veronica; Saunders, J. & Armstrong, G. (2006): *Principlesof Marketing*, Prentice-Hall, 2003.,Prijevod, MATE, Zagreb

Kotzab, H.&Bjerre, M. (2005).*Retailing in a SCM-perspective*. In Kotzab, H. (Ed.),*Retailing- the context of IT and distribution,14-29* Copenhagen: CopenhagenBusiness School Press

Kotzab, H.&Bjerre, M. (2005).*Retailing in a SCM-perspective*. In Kotzab, H. (Ed.), *IT application in retail store* ,Copenhagen: Copenhagen Business SchoolPress, 2005

Kotzab, H., &Bjerre, M. (2005) Retailing in a SCM-perspective. In Kotzab, H. (Ed.).*The automation of retail logistics*, Copenhagen Business SchoolPress, 2005

Krippendorff, K. (2012*). Content analysis: An introduction to its methodology*. Accessed on 16.2.2014 at: http://eau.sagepub.com/ content/20/1/187.

Kulp, S.C., Lee, H.L. &Ofek, E. (2004), "Manufacturer benefits from information integration with retail customers", Management Science, 50 (4),431-444

Lambert, D. M. (2004)Supply Chain Management: Processes, Partnerships and Performance, Sarasota, Florida: Supply Chain Management Institute.

Lambert, D.M., Stock, J.R. &Ellram, L.M. (1998) *Fundamentals of logistics management,* Singapore: McGraw-Hill.

Larson, P.D., Poist, R.F. &Halldórsson, A. (2007) Perspectives on logistics vs. SCM: a survey of SCM professionals. *Journal of Business Logistics* 28: 1-24.

Lee, H.L., So, K.C. and Tang, C.S. (2000), "The value of information sharing in a two-level Supplychain",*Management Science*, 46 (5) 626-643.

Li, L. (2002), "Information sharing in a supply chain with horizontal competition", *Management Science*, 48 (9) 1196-1212.

Liyanage JP & Kumar U (2003) Towards a value-based view on operations and maintenance Performance management. *Journal of Quality in Maintenance Engineering*

Liu J &XinshengKe (2012).Improvement in logistics of fresh agricultural products, *Journal of System and Management Sciences,* 2 (2) 36-45

McGrath, W. (2007).*Impact Analysis of Large-Scale Lean Manufacturing Initiatives Upon Manufacturing Process Innovation in Irish Companies*, Doctoral dissertation, Waterford Institute of Technology.

Mersha T. Tsige, 2013) *Improving order-picking efficiency via storage assignment strategies*. University of Louisville, Logistics & Distribution Institute.

Miller, R. (2008). *International Political Economy: Contrasting World Views*. London: Routledge.8: 216-236

Mogalakwe, M. (2006).*The use of documentary research methods in social research*. African Sociological Review

Mugenda, O, &Mugenda, A. (2003). *Research Methods*. African Centre for Technology Studies (ACTS), Nairobi

Muhcina,(2008), Physical *Distribution, Logistics and Supply chain management*–1053-1054. Accessed on 16.5.2015 Source:http://globaltext.terry.uga.edu/userfiles/pdf/Core%20Concepts%20of%20Marketing.pdf

Ogolla, A. G. (2012). *Politicizing Structural Adjustment Policies in Kenya's Sugar Industry: Effects on pro-poor development outcomes,* A Research Paper presented: Kenya 2012 Regional Economics, Canberra

Randall, W.S., Defee, C.C. & Brady S.P. (2010). Value propositions of the U.S. trucking industry, *Transportation Journal*, 49(3), 5-23.

Stuart M & Nicola H,(2000*) Research Methods Handbook, Introductory guide to research methods for social research*.

Tompkins, J., White, J., Bozer, Y., &Tanchoco, J. (2003). Facilities planning:New Jersey, Wiley

Walliman.N, (2011)*Research Methods The Basics*,ISBN 0-203-83607-3 Master e-book

Wireman T (2007) *How to calculate return on investment for maintenance improvement Projects*

Whitmarsh, L. E. (2005***). A study of public understanding of and response to climate change in the South of England***. A thesis submitted for the degree of Doctor of Philosophy, University of Bath, Department of Psychology.