# FACTORS AFFECTING SOURCING OF PACKAGING MATERIALS IN DAIRY INDUSTRY IN KENYA: A CASE STUDY OF DAIRY FIRMS IN KENYA

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**Abstract**

*The research was aimed at investigating the factors affecting sourcing of packaging materials in dairy industry in Kenya. Specifically, lead time, supplier selection, transport infrastructure and logistics management are to be studied to determine their effects on sourcing of packaging materials in dairy sector The target population of the study was 97 and the sample size was 33 selected using stratified sampling. The sampling frame was all the purchasing managers or their equivalent of the selected firms. The data was analyzed using descriptive statistics and this was done using SPSS 21. Pearson's correlations coefficients were run to examine the relationship between the independent and dependent study variables that are set out in the objectives of the. The research recommends that logistics management should be reduced by proper forecasting, timely placing of orders and selection of reliable suppliers and the use of new technology. The suppliers must be competitively selected through an objective supplier evaluation attributed to quality, timeliness and consistency. In order to practice the best logistics management methods, the organization has to develop the best means of transport. Finally, the challenges faced due to poor infrastructure and other related matters can be countered by a collective approach by both private and public sectors to expand roads, ports, telecommunication and internet connectivity.*

*Keywords: lead time, supplier selection, logistics management, transport infrastructure, sourcing*

## INTRODUCTION

Studies indicate that much is spent on the procurement of raw materials used in the manufacture of the consumables (Nakatani *et al.*, 2020). In 2009, Packaging institute says that more than four hundred and nineteen billion United State dollars was spent on the procurement and consumption of packaging, and the Consumer-Packaged Goods industry accounted for 32% of this expenditure (Lewis et al., 2019). In addition, packaging accounts for 4-11% of the cost of the finished product and constitutes one of the largest sources of material costs for companies in the industry. Among other factors that claim the genesis of the high cost of purchasing practice of the packaging materials in the dairy industry are; Poor connectivity, long lead times and ineffectiveness in the logistics management(Klaiman *et al.*, 2016).

The tactical approach taken for sourcing of these materials often results in an inefficient supplier base and excessive inventories leading to high costs in supply chain operations. Effective sourcing practices enable companies to achieve significant efficiencies and cost reductions in supply chain, in addition to ensuring supply assurance (Hultman et al., 2019). This research is seeking to establish factors affecting sourcing of packaging materials in dairy firms in Kenya in their different extents.

## Objectives of the Study

### General Objective

The purpose of the study was to establish the factors affecting the sourcing of packaging materials in dairy industry in Kenya.

### Specific Objectives

i. To investigate the effect of lead time in sourcing of packaging materials in dairy industry in Kenya.
ii. To access the effect of logistics management in sourcing of packaging materials in dairy industry in Kenya.
iii. To determine the effect of supplier selection in sourcing of packaging materials in dairy industry in Kenya
iv. To explore the effect of transport infrastructure in sourcing of packaging materials in dairy industry in Kenya.

## Research Questions

i. In what ways does lead time affect the sourcing of packaging materials in dairy industry in Kenya?

ii. To what extent does logistics management affect the sourcing of packaging materials in dairy industry in Kenya?

iii. What are the effects of supplier selection on the sourcing of packaging materials in dairy industry in Kenya?

iv. How does transport infrastructure affect the sourcing of sourcing of packaging materials in dairy industry in Kenya?

## CONCEPTUAL FRAMEWORK

Díaz et al.,( 2015) defined a conceptual framework as a visual or written product, one that "explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them."

LEAD TIME
- Due dates scheduled
- Delivery windows

SUPPLIER SELECTION
- Green design capability
- Quality
- Price

LOGISTIC MANAGEMENT
- In time delivery
- Inventory accuracy

TRANSPORT INFRASTRUCTURE
- Accessibility
- Availability of transport infrastructure

Sourcing of packaging materials in dairy industry in Kenya

*Independent variables*                    *Dependent variable*
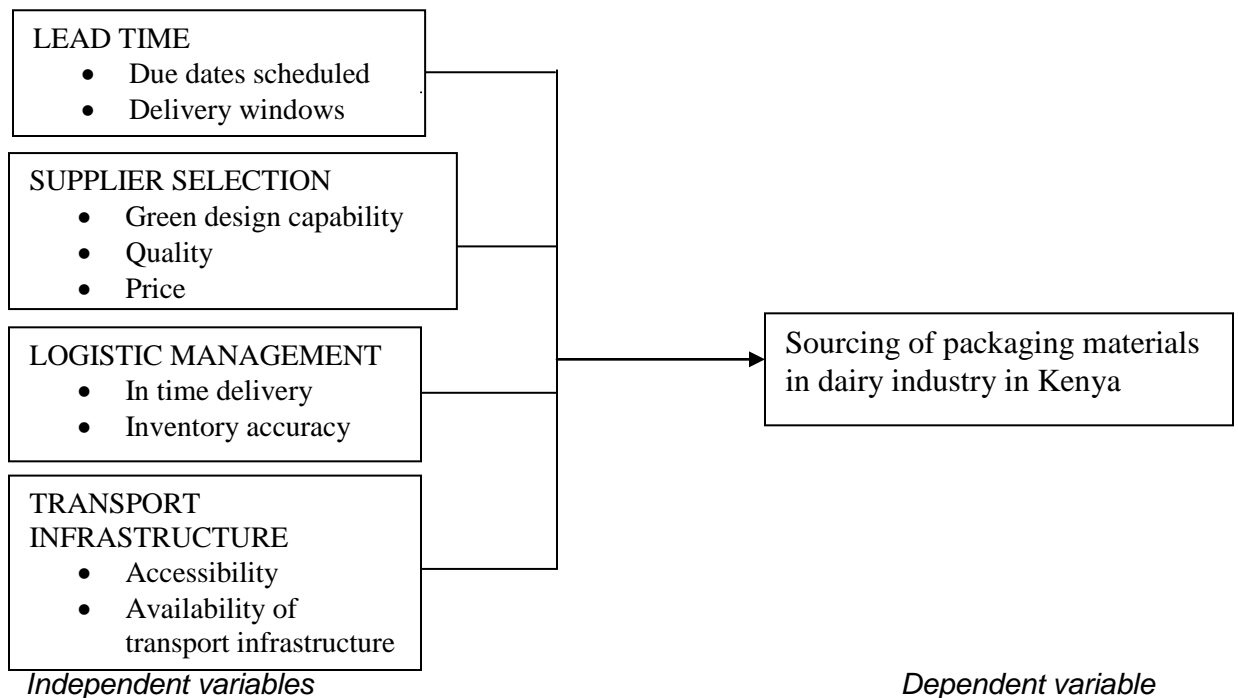
## LITERATURE REVIEW

### Lead time

According to Earis, (2018)), Lead time has the same definition as that of supply chain management, but it includes the time required to ship the parts from the supplier. This shipping time is included because the manufacturing company needs to know when the parts will be available for materials requirement planning.(Dumas et al., 2014) It is also possible for lead time to include the time it takes for a company to process and have the part ready for manufacturing once it has received.

## Logistics Management

This is the aspect of managing both movement and storage of goods and materials from the source to the ultimate point of consumption and the related information flow. It also refers to the total management of key operational functions of the supply chain, procurement, production and distribution (Jahre et al., 2016).Mainly it involves planning, implementation and controlling the efficient and effective flow of storage of goods, services and related information from the point of origin to the point of consumption in order to meet the customer requirements Jamshidi, (2011).

## Supplier Selection

According to (Dobos & Vörösmarty, 2014), it follows a formal vendor evaluation system. They are given standing status or titles according to their attainment of some level of performance such as lead times, quality and timely delivery. Singh, (2014) stated that rating system is part and parcel of manufactures and service firms to ensure matching characteristics of a purchased good or services.  According  to Hwang et al., (2006), while it is uncertain whether individual firms are consistent in the manner in which they certify vendors, equality certification would likely require that vending  firms  be part of a formal educating program, utilize statistical process  control and  have  quality assurance plan (written procedures)

## Infrastructure

Infrastructure is the physical and organizational structural needs for the operations of the society, or the services and the facilities necessary for the operation of a society( Llanto, 2015). It can be defined as the set of interconnected structural elements that provide a framework supporting an entire structure of development. Infrastructure can be hard or soft. Hard infrastructure refers to the large physical network necessary for the working of the society. While soft refers to all institutions which are required to maintain the economy. This means the necessary facilities required in the logistic which includes roads and electricity (Portugal-Perez & Wilson, 2012). According to Hope, Sr, (2010) Poor infrastructure includes impassable roads where trucks transporting goods may get stuck hence the cause of late deliveries of goods and services. Roads full of potholes are evident in many parts of Kenya. These will not only cause damage to the produce especially if they are perishable goods but also lead to faster wear and tear of the vehicles. Inefficient traffic management causes a lot of jam and this alone amounts to endless congestion resulting to late deliveries of goods and services creating utilities e.g. goods and services satisfying wants, purchasing is not confined to manufacturing only but also a function activity undertaken by both private and public sector (Wilberforce Odiwuor et al., 2015)

## RESEARCH METHODOLOGY

Descriptive research design was used by the researcher in the study, of factors affecting sourcing of packaging material in dairy industry in Kenya. According to (AECT, 2018), descriptive research is a process of collecting data in order to test hypothesis or to answer questions concerning the current status of subjects under study. A descriptive research determines and reports the way things are. This method was preferred because it allowed for an in-depth study of the case.

The target population of the study was 97 and the sample size was 33 that were selected using stratified sampling. The sampling frame was all the purchasing managers or their equivalent of the selected firms. The questionnaires were dropped at the procurement department. The collected data was edited, coded and entered for analysis. Prior to the survey administration, the researcher distributed 10 questionnaires for pre-testing. This was done to determine validity and reliability of the research that was to be carried out to ensure that the scale items are meaningful to the sample and captures the issues that were be measured. The data was analyzed using descriptive statistics and this was done using SPSS version 21. The findings were presented in pie charts, bar graphs, and tables for clarity. Pearson's correlations coefficients were run to examine the relationship between the independent and dependent study variables that are set out in the objectives of the study

## ANALYSIS AND DISCUSSIONS

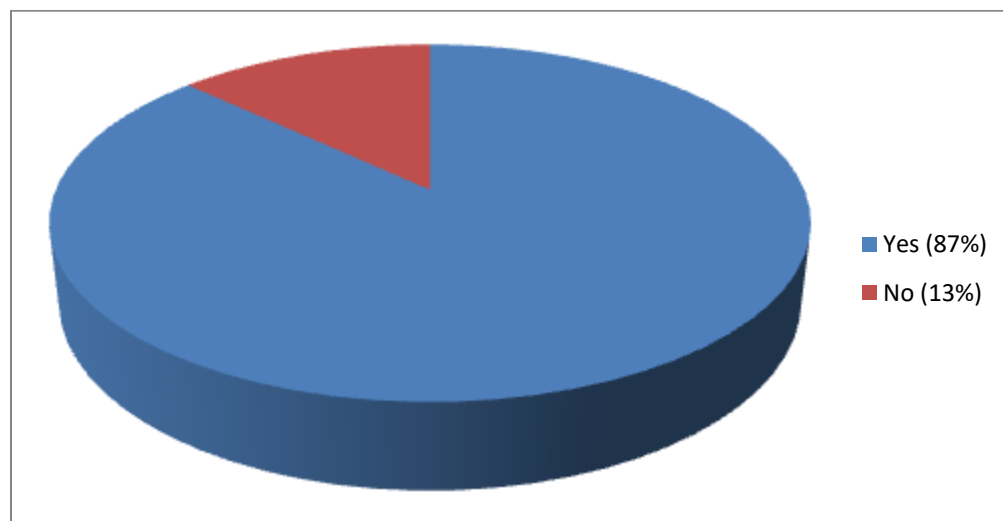### Descriptive analysis

*Lead Time*



Figure 1: Effect of lead time

Figure 1 above indicates that most of the respondents have agreed that lead time affects sourcing of packaging materials. From the findings 87% of the respondents agreed that lead time affects sourcing of packaging materials while 13% disagreed.

### *Rating the effect of lead time*

Table 1: Rate of effect of lead time on sourcing of packaging materials

| Category | Frequency | Percentage (%) |
|---|---|---|
| Great | 13 | 70 |
| Moderate | 4 | 21 |
| Low | 2 | 9 |
| Total | 19 | 100 |

Table 1 above indicates the rate of effect of lead time in the sourcing of packaging materials in the dairy industry. From the findings 70% of the respondents said that lead time affects sourcing of packaging materials to great extent, 21% to moderate extent while 9% to low extent. The conclusion led the decision that lead time affects greatly the sourcing of packaging materials in the dairy industry.

### *Duration it takes for requested items to be delivered (the lead time)*

Table 2: Lead time of the organization

| Time Taken | Frequency | Percentage (%) |
|---|---|---|
| Too Long | 10 | 53 |
| Right on time as agreed | 5 | 28 |
| Lesser duration than specified | 4 | 19 |
| Total | 19 | 100 |

The above table shows how long the organization has to wait before the requested materials are delivered by supplier. According to the table, 53% of the respondents said that the lead time is long, where as 28% said that suppliers deliver on time while the rest of the respondents (19%) said that suppliers exceeded the expectations by delivering before the agreed dates fall due.
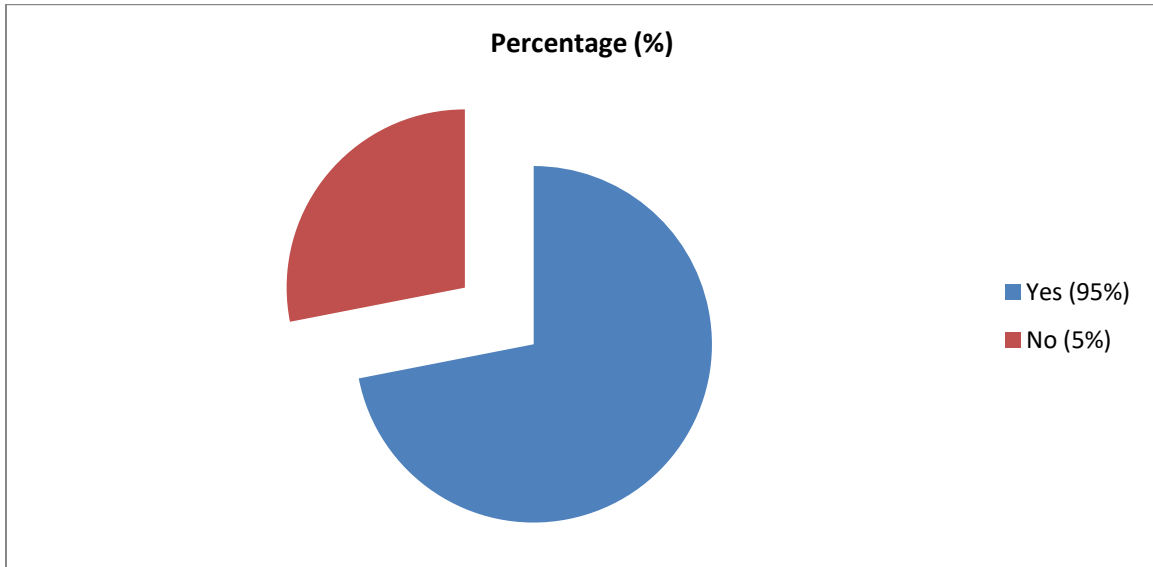
*Supplier selection*



Figure 2: Effect of Supplier selections on sourcing of raw materials

Figure above indicated the effect of supplier selection on sourcing of packaging materials in the dairy industry. From the findings 95% of the respondents said that supplier selection affects sourcing of packaging materials while 5% said that it does not. The conclusion made from this study is that supplier selection affects the sourcing of packaging materials in the dairy industry.

*Rating the effect of supplier selection*

Table 3: Extent to which Supplier selection affects the sourcing of packaging materials

| Categories | Frequencies | Percentage (%) |
|---|---|---|
| Great | 13 | 70 |
| Moderate | 5 | 25 |
| Low | 1 | 5 |
| **Total** | **19** | **100** |

Table 3 above illustrates the rate at which supplier selection affect sourcing of packaging materials in the dairy sector. From the findings 70% of the respondents said that supplier selection affects sourcing of packaging materials to great extent, 25% to moderate extent while 5% to low extent. The conclusion led the decision that supplier selection affects, greatly, the sourcing of packaging materials in the dairy sector.

*Logistics management*

Table 4: Effects of logistics management on

sourcing of packaging materials

| Means | Respondents | Percentage (%) |
|---|---|---|
| Yes | 15 | 81 |
| No | 4 | 19 |
| Total | 19 | 100 |

Table 4 above indicates the effect of logistics management on sourcing of packaging materials in the dairy industry. From the findings 81% (15) of the respondents said that logistics management affects the sourcing of packaging materials while 19% (4) said that it does not. The conclusion made from this study is that logistics management affects the sourcing of packaging materials in the dairy industry.

*Rating the effect of logistics management*

Table 5: Extent to which Logistics Management affects

the sourcing of packaging materials

| Categories | Frequencies | Percentage |
|---|---|---|
| Great | 13 | 68 |
| Moderate | 5 | 26 |
| Low | 1 | 6 |
| Total | 19 | 100 |

Table 5 above illustrates the rate at which logistics management affect sourcing of raw materials in the dairy industry. From the findings 68% of the respondents said that logistics management affects sourcing of packaging materials to great extent, 26% to moderate extent while 6% to low extent. The conclusion led the decision that logistics management affects, greatly, the sourcing of packaging materials in the dairy sector.

### *Type of personnel managing logistics*



Figure 3: The caliber of personnel managing logistics

Figure 3 shows the kind of personnel which has been entrusted with the task of managing logistics of the organization. From the findings 70% (13) of the respondents said that logistics is managed by qualified persons while 30% (6) said that the persons are not qualified for the job.

### *Effects of transport infrastructure*

Table 6: Effects of transport infrastructure in sourcing of packaging materials

| Response | Frequency | Percentage (%) |
|---|---|---|
| Yes | 18 | 94 |
| No | 1 | 6 |
| **Total** | **19** | **100** |

According to the table 6, 94% of the respondents were for the opinion that infrastructure determines the effectiveness of sourcing of packaging materials in the dairy sector while 6% said there is no effect on sourcing of packaging materials in the dairy industry. Hence this led to interpretation that infrastructure affects sourcing of packaging materials in the dairy industry.

*State of transport infrastructure*
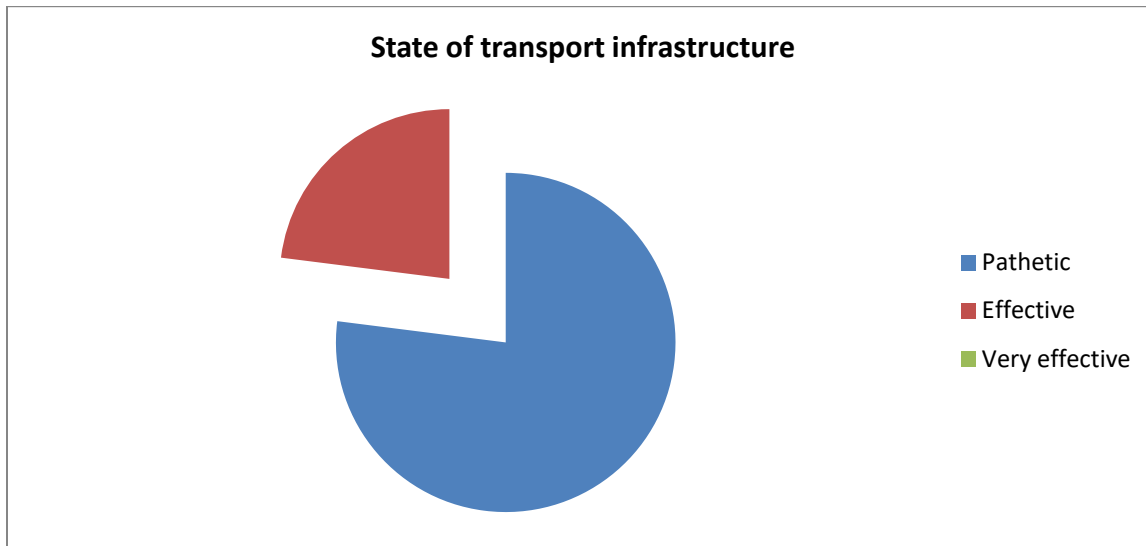
**State of transport infrastructure**



Figure 4: State of the transport infrastructure in areas where the organization operates

The figure above shows the state of the transport infrastructure. The findings shows that 77% of the respondents are of the opinion that transport infrastructure are at a bad state whereas it is only 23% who are of the opinion that the transport infrastructure is effective. None said it is very effective.

*Mode of transport used by the organization*

Table 6: Mode of transport

| Categories | Frequencies | Percentage |
|------------|-------------|------------|
| **Road** | 18 | 94 |
| **Air** | 1 | 6 |
| **Rail** | 0 | 0 |
| **Total** | **19** | **100** |

The above table and a bar graph show the modes of transport used by the organization to deliver the sourced packaging materials. According to the findings the organization's primary mode of transport is road as evidenced by 94% of the respondents. Only 6% said that the organization uses air transport whereas rail transport according to the findings is not used completely.

***Rating the effects of Transport Infrastructure in sourcing of packaging materials***

Table 7: Rating the effect of Transport Infrastructure

| Categories | Frequencies | Percentages (%) |
|---|---|---|
| **Great** | 16 | 82 |
| **Moderate** | 2 | 11 |
| **Low** | 1 | 7 |
| **Total** | **19** | **100** |

From the table above, it can be observed that 82% of the respondents said that infrastructure affect the sourcing to great extent, 11% said it does affect moderately while 7% said it affect but to low extent. The conclusion from the information obtained herein was used to deduce that infrastructure affects the sourcing of packaging materials in great levels.

**Inferential Analysis**

***Correlation Analysis***

Table 8: Pearson Correlation

| | | Sourcing of packaging materials | Lead time | Logistics management | Supplier selection | Transport infrastructure |
|---|---|---|---|---|---|---|
| Sourcing of packaging materials | Pearson Correlation | 1 | | | . | |
| | Sig. (1-tailed) | | | | | |
| Lead time | Pearson Correlation | $.491^{**}$ | 1 | | | |
| | Sig. (1-tailed) | .000 | | | | |
| Logistics management | Pearson Correlation | $500^{**}$ | $.501^{**}$ | 1 | | |
| | Sig. (1-tailed) | .000 | .000 | | | |
| Supplier selection | Pearson Correlation | $.404^{**}$ | $.393^{**}$ | $.699^{**}$ | 1 | |
| | Sig. (1-tailed) | .000 | .000 | .000 | | |
| Transport infrastructure | Pearson Correlation | $.431^{**}$ | $.529^{**}$ | $.653^{**}$ | $.541^{**}$ | 1 |
| | Sig. (1-tailed) | .000 | .000 | .000 | .000 | |

Correlation is significant at the 0.01 level (1-tailed).

Table 8 indicates that lead time has the strongest positive influence on sourcing of packaging materials as attributed by the correlation coefficient of 0.500 and a p-value of 0.00.in addition, logistics management, supplier selection and transport infrastructure are positively correlated to sourcing of packaging materials with Pearson correlation values of 0.491, 0.404 and 0.431 respectively and p-values of 0.000 respectively. This correlation matrix implies that the independent variables: lead time, logistics management, supplier selection and transport infrastructure have crucial effect on sourcing of packaging materials. This is in agreement with the literature review where Brennan *et al.*, (2013) emphasizes that focus on lead time, logistics management, supplier selection and transport infrastructure are positively correlated with sourcing of packaging materials. All the independent variables are positively related since their p-values are less than 0.05.

## *Regression Analysis*

A multiple linear regression analysis was done to examine the relationship of the independent variables with the dependent variable. The adjusted $R^2$ is the coefficient of determination. This value explains how sourcing of packaging products varied with lead time, logistics management, supplier selection and transport infrastructure. The model summary table shows that four predictors can explain 57.6% of change in sourcing of packaging materials namely lead time, logistics management, supplier selection and transport infrastructure an implication that the remaining 42.4% of the variation in buyer-supplier management could be accounted for by other factors not involved in this study. This shows that the variables are very significant therefore need to be considered in any effort to boost sourcing of packaging materials in dairy firms in Kenya.

### Table 9: Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .765[a] | 0.585 | 0.576 | 0.85021 |

a. Predictors: (Constant), lead time, logistics management, supplier selection, transport infrastructure

## *Analysis of variance (ANOVA)*

Analysis of variance (ANOVA) was done to establish the fitness of the model used. The ANOVA table shows that the F-ratio (F=67.188, *p*=.000) was statistically significant. This means that the

model used was appropriate and the relationship of the variables shown could not have occurred by chance.

Table 10: ANOVA

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| | Regression | 194.271 | 4 | 48.568 | 67.188 | .000[b] |
| | Residual | 138.067 | 191 | 0.723 | | |
| 1 | Total | 332.338 | 195 | | | |

a. Dependent Variable: sourcing of packaging materials

b. Predictors: (Constant), lead time, logistics management, supplier selection, transport infrastructure

### *Coefficients of determination*

The estimated coefficients (βs) show the contribution of each independent variable to the change in the dependent variable. The coefficients table results show lead time (β=.558, $p$=.000) positively and significantly affected sourcing of packaging materials in manufacturing firms. The results also show that logistics management (β=.151, $p$=.002) positively and significantly affected sourcing of packaging materials in manufacturing firms. Supplier selection (β= 1.114, $p$=.000) and transport infrastructure (β=.057, $p$=.013) also were found to be positively and significantly affecting sourcing of packaging materials.

Table 11: Coefficients of determination

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| | (Constant) | 4.006 | 0.225 | | 17.838 | 0.000 |
| | Lead time | 0.558 | 0.087 | 0.445 | 6.419 | 0.000 |
| | Logistics management | 0.151 | 0.049 | 0.148 | 3.083 | 0.002 |
| | Supplier selection | 1.114 | 0.079 | -0.939 | -14.142 | 0.000 |
| 1 | Transport infrastructure | 0.003 | 0.057 | -0.003 | -0.058 | 0.013 |

a. Dependent Variable: Relationship management

From the multiple regression results in table 11, the equation,

$Y = α + β_2 x_2 + β_3 x_3 + β_4 x_4 + e$     becomes:

$Y = 4.006 + 0.558 x_1 + 0.151 x_2 + 1.114 x_3 + 0.003 x_4 + e$

Where: $x_1$=lead time, $x_2$=logistics management, $x_3$=supplier selection, $x_4$=transport infrastructure, e =error.

According to the regression equation established, holding all independent factors a constant then sourcing of packaging materials will be 4.006. From the regression equation, taking all other independent variables at zero, a unit increase in lead time will lead to a 0.558 increment in sourcing of packaging materials. A unit increase in logistics management will lead to a 0.151 increment in sourcing of packaging materials. A unit increase in supplier selection will lead to a 1.114 increment in sourcing of packaging materials and a unit increase in transport infrastructure will lead to a 0.003 increment in sourcing of packaging materials. This insinuates that supplier selection contribute more to the sourcing of packaging materials followed by lead time.

At 5% level of significance and 95% level of confidence, lead time had a 0.000 level of significance; logistics management showed a 0.002 level of significant, supplier selection showed a 0.000 level of significant and transport infrastructure had a 0.013 level of significant. Hence, the most significant factors are transport infrastructure and lead time.

## SUMMARY OF FINDINGS

### Lead time on sourcing of packaging materials

The study evaluated the influence of lead time on sourcing of packaging on dairy firms in Kenya. First the study sought to determine the extent to which lead time affect sourcing of packaging products and according to the findings of the study majority of the respondents agreed that it affects sourcing of packaging products. These results have revealed that lead time positively and significantly affect sourcing of packaging products of dairy firms in Kenya.

### Logistics management on sourcing of packaging materials

The study showed the influence of logistics management on sourcing of packaging materials on dairy firms in Kenya. These results have revealed that logistics positively and significantly affect sourcing of packaging materials of dairy firms in Kenya.

### Supplier selection on sourcing of packaging materials

The study also evaluated the influence of supplier selection on sourcing of packaging materials on dairy firms in Kenya. These results have revealed that commitment positively and significantly affect buyer-supplier relationship management of dairy firms in Kenya

### Transport infrastructure on sourcing of packaging materials

The study establishes transport infrastructure and sourcing of packaging materials of dairy firms in Kenya and their suppliers have been achieved to great extent. According to the findings

majority of the respondent agreed that transport infrastructure affect sourcing of packaging of material. These results have also revealed that transport infrastructure positively and significantly affect sourcing of packaging materials of dairy firms in Kenya

## CONCLUSIONS

Following the results of the study, it is worthwhile to conclude that there is positive relationship between lead time, logistics management, supplier selection and transport infrastructure and sourcing of packaging materials of dairy firms in Kenya. Through lead time, logistics management, supplier selection and transport infrastructure, dairy firms have continued to be at the heart of Kenya's economic success story. The study also establishes that supplier selection has the strongest positive influence on sourcing of packaging materials of dairy firms in Kenya. The study also establishes that communication was rated the lowest among the research variables meaning that the dairy firms are yet to fully realize the benefits in the firms and their suppliers can get due to good and integrated communication system.

## Recommendations

The study recommends that management of dairy firms in Kenya should take into account the variables considered since the findings shows that there is significant and relationship between the predictors (lead time, logistics management, supplier selection and transport infrastructure) and sourcing of packaging materials in dairy firms in Kenya.

Since majority of the respondents agreed that lead time, logistics management, supplier selection and transport infrastructure leads to positive and significant sourcing of packaging materials, all dairy firms in Kenya should be encouraged to put these factors into consideration since it they will greatly help them attain degree of competiveness apart from achieving good sourcing of packaging materials.

## Limitations of the current study

While the study has been well executed, some limitations have been encountered including time as well as corona virus pandemic constraints. The research holds economical obstructions that made the execution of the entire work to a certain point of difficulty. Additionally, there was limited access to the people for interview and collecting more data involved in carrying out the investigation to complete within a certain period of time was also experienced.

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