Promoting Logistics Visibility in Supply Chain and Its Influence on Performance of Manufacturing Industry: A Study on Kenya's Food and Beverage Manufacturing Firms

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ABSTRACT

This paper sought to examine the relationship between logistics visibility and performance of large food and beverage manufacturing firms in Kenya. The study was anchored on transaction cost analysis theory. The study utilized a cross-sectional research design. The target population was 561 respondents drawn from the 187 large food and beverage manufacturing firms in Kenya. The sampling frame for the study was the human resource managers in each of the food and beverage manufacturing firms since they are the custodians of all the employees in the firms. Using a stratified random sampling, a sample of 228 respondents was selected. A structured and semi-structured questionnaire was used to collect data for the study. Using a 10% of the sample size, the questionnaire was pilot-tested to assess validity and reliability before the actual data was collected. The data was analyzed using SPSS version 27. The data was presented using tables. The findings revealed that logistics visibility significantly and positively influenced performance of food and beverage manufacturing firms. It was concluded that as a result of ineffective embrace of logistics visibility, the manufacturing firms failed to optimize their supply chain towards enhancing performance. The study recommended the essence of logistics visibility as a way of ensuring control of logistics processes among the food and beverage manufacturing firms for better performance.

Keywords: Firm Performance, Food and Beverage Manufacturing Firms, Logistics Visibility, Supply Chain Visibility
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I. INTRODUCTION

Supply chain visibility (SCV) is the process of tracking down the flow of goods/products from the supplier to the customer through the manufacturer. It involves putting across measures and systems that ensure proper tracking of the customer orders and harmonizing them with the suppliers' ability to deliver and their planned delivery time (Moshood et al., 2021). This ensures that the suppliers are able to deliver goods on time based on the customers' orders, and the manufacturer is able to meet the needs of the customers. In the modern business market, leading organizations particularly those in the manufacturing sector are embracing supply chain visibility as a way of enhancing their efficiency in supply chain processes. According to Swift et al. (2019), companies have suffered losses over long waiting hours for the suppliers to deliver the merchandise while in other occasions the suppliers deliver early than expected thus making the companies incur extra costs for holding idle inventory.

Logistics refers to the movement of inventory from the supplier to the area of storage where need be, and finally to the final destination (Xu et al., 2020). Logistics visibility means the stakeholders in the goods are able to see details of the goods in transit. Nowadays, companies increasingly see themselves as part of a supply chain to compete against other supply chains, than a single firm competing against other individual firms. In the past two decades, there has been a trend that manufacturers, distributors and logistics service providers in join hands to collaborate in business operations and decision-making (Zhou, 2015). Enhancing logistics visibility means that the company is in a position to fully control its logistics and have a well-framed flow of its goods from the point of origin to the final consumers (Rogerson & Parry, 2020). Logistics visibility has been argued to be one of the integral critical success factors in supply chain, where organizations are able to ensure that their logistics and long-standing the changing dynamics, and well monitored to achieve the intended goals.

Logistics visibility, as a component of supply chain visibility, encompasses the planning, execution, and supervision of the smooth flow and storage of goods, services, and associated information from the point of origin to the point of consumption, with the aim of meeting customer needs (Kalaiarasan et al., 2022). Companies often engage in partnerships within the supply chain to enhance product distribution and achieve cost savings in logistics visibility (Ahmed et al., 2021). Presently, many companies rely on external logistics providers to collaborate with business

partners and customers, facilitating information exchange throughout the supply chain. Given that logistics constitutes a cornerstone activity in the supply chain, it is imperative to optimize it and improve its efficiency to enhance firm performance (Kharlamov & Parry, 2018). This can be accomplished through continuous monitoring of goods flow, ensuring seamless processes for efficient delivery to end consumers. Furthermore, organizations must establish well-defined logistics processes to monitor the flow effectively, facilitating easier management (Mwangeka, 2020).

Logistics visibility is also addressed in terms of transportation. The process of managing transportation and ensuring that it is aligned to the best possible route ensures that the logistics are more visible and manageable (Jermsittiparsert & Srisawat, 2019). Transportation is the main practice in logistics, thus its effectiveness is a key determinant to the success of the supply chain process. To enhance supply chain visibility, it is integral for organizations to have a means of managing the transportation process to ensures effectiveness and enhance performance (Saqib & Zhang, 2021). Lead time is another aspect that ought to be considered in the logistics visibility (Mwangeka & Odok, 2020). This is guided by the urge to have a more significant and effective logistics process that saves on time and enhances customer satisfaction. Logistics visibility through lead time implies that the organization is not only aiming at enhancing visibility of the delivery process, but also ensuring that lead time is significantly reduced for better customer satisfaction.

The manufacturing sector in Kenya has been applauded as a one of the major economic backbones, playing a fundamental role in supporting other sectors such as the agricultural sector, real estate sector, infrastructure development, as well as the overall job creation in the country (Muthoni & Mose, 2020). One of the sub-sectors of the manufacturing sector in Kenya is the food and beverage manufacturing firms. The food and beverage manufacturing firms in Kenya make majority of the manufacturing sector, with over 40% of the firms listed under the Kenya Association of Manufacturers being from this sub-sector. Kenya association of manufacturers (KAM) describes this category of manufacturing sector as the most vulnerable while at the same time most critical, owing to the customer's ability to change tastes and preferences frequently, entry of international players into the market, and increased dynamism in the entire manufacturing sector, which exposes the firms to a major threat of losing markets. The food and beverage manufacturing firms are the firms that deal with processing, value addition, packaging and distribution of food related products such as cooking oil, maize and wheat flour among others and packaged beverages such as carbonated drinks, fresh juices among others (Muteshi et al., 2018). Most of these firms rely on varied and extensive supply chain processes, whereby they incorporate both push and pull processes, thus supply chain visibility is major requirement for the continued performance.

1.1 Statement of the Problem

The manufacturing sector in Kenya has over the recent past facing a declining trend, calling for robust interventions that do not focus on a single perspective but all-rounded in areas such as finance, accountability, divestment, research and development, and most importantly, the supply chain process. Recently, some of the leading food manufacturing companies like Unga group recorded an 88% decline in profits in the year ended June 2020 and others like Del Monte have recorded over 45% decline in revenues (Muiruri, 2021). In the year 2020, it was reported that Chemilil sugar company had an accumulated losses of over Kshs.6.05billion (Igadwah, 2019) while others like Nzoia Sugar were ruled insolvent by the auditor general after recording over Kshs.49.7 billion of accumulated debts (Ndanyi, 2021). These among other statistics reveal that the food and beverage manufacturing sector is at stumble, prompting the question on what could be lacking that is making the companies sink into losses over the years, while others in the same industry are rapidly growing and recording increased profits.

Available literature shows that logistics visibility is fundamental in steering organizational performance. A study by Khalifa et al. (2021) revealed that logistics visibility had a significant impact on the seamless flow of goods across the supply chain thus promoting organizational performance. Rogerson and Parry (2020) on the other hand revealed that logistics visibility was essential for enhancing organization's control of distribution processes thus steering its effectiveness. A study by Leończuk (2021) showed a weak relationship between logistics visibility and organizational performance. These studies show mixed results and also they have been carried out in different contexts. This motivated this study to examine the relationship between logistics visibility and performance of food and beverage manufacturing firms in Kenya.

1.2 Research Objectives

i.   To examine the extent to which large food and beverage manufacturing firms in Kenya have embraced logistics visibility in their supply chain
ii.   To assess the performance status of large food and beverage manufacturing firms in Kenya
iii. To evaluate the relationship between embrace of logistics visibility and performance status of large food and beverage manufacturing firms in Kenya.
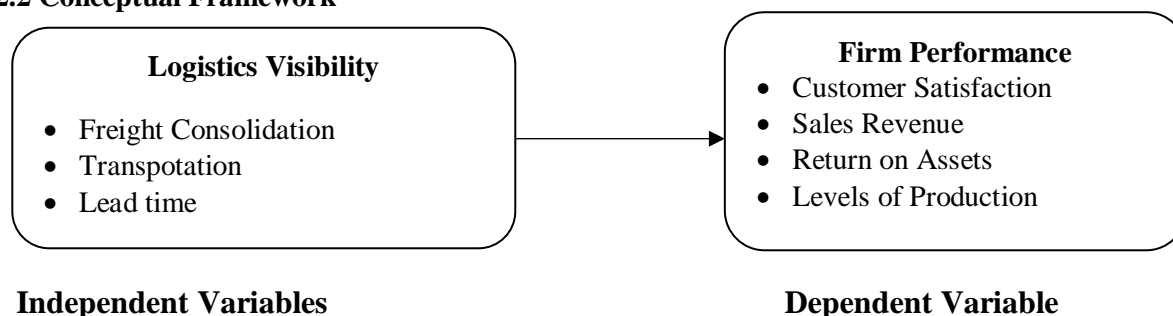
II. LITERATURE REVIEW

2.1 Theoretical Review
2.1.1 Transaction Cost Analysis (TCA) Theory

This paper was anchored on Transaction Cost Analysis (TCA) theory by Coase (1937). The theory expounds on the economic benefits of the firm having prolonged relationship with its partners. The theory explains the need for visibility of multiple firms as a way of reducing costs and promoting efficiency in the operations. According to Rindfleisch and Heide (1997), the TCA theory best fits in the context of supply chain visibility and visibility, in that it points out to when a firm should consider having expansion of its boundaries to incorporate other key players in the industry such as the suppliers. A company can reduce its total transaction costs by integrating suppliers into their operation framework and ensuring the suppliers fully understands what the customers want (Yu & Goh, 2014). Through this theory, the study will assess the role played by supplier visibility in enhancing firm performance.

For a business to choose whether to perform a particular activity, transactional cost analysis becomes very important. The theory uses transaction as the unit of analysis and divides transaction costs into production and co-ordination costs (Bergman et al., 2019). According to the theory, transaction costs arise at contracting (drafting, negotiation and safeguarding) or at implementation (maladoption, haggling and establishment, operational and bonding costs). Decision makers must weigh and compare the costs associated with executing a transaction within their firms (in-house) and outsourcing. The foundations of TCA were laid down by Coase (1937) and were further developed by Williamson (1991; 1994). Fundamentally, TCA suggests that transaction costs related to make or buy decision impact the choice between the firm and the market. The transaction costs analysis helps in deciding whether to perform activity in-house or outsource from third party. According to TCA, there are five determinants of transaction costs, namely transaction frequency, asset specificity, uncertainty, bounded rationality, and opportunistic behavior.

In supply chain management, when dealing with customers the company has to anlayse its transactional costs and determine the best ways to enhance the satisfaction of the customers through the minimal costs possible (Rogerson & Parry, 2020). The transaction costs include the costs incurred when handling customers and when meeting their needs and requirements. It is essential for companies to ensure that they analyse what costs will be required in meeting varied needs of their customers, thus planning effectively for continued effectiveness and performance (Hamadneh et al., 2021). The customer visibility is one of the aspects of supply chain visibility that requires a proper analysis of the costs for the company to continue supporting the customer-oriented goals. The transactional cost theory, therefore, aligns with the need for customer visibility in supply chain processes, thus the theory was used to highlight on the need for role played by logistics visibility on the performance of food and beverage manufacturing firms

2.2 Conceptual Framework

Logistics Visibility		Firm Performance
• Freight Consolidation • Transpotation • Lead time	→	• Customer Satisfaction • Sales Revenue • Return on Assets • Levels of Production
Independent Variables		**Dependent Variable**

Figure 1
Conceptual Framework

2.2 Empirical Review

Given the complexity of supply chain issues even in a research context, it is understandable that research collaboration, either between scholars or between academia and industry is needed to meet publication outcomes (Papert et al., 2016). Recently, research collaboration has become a focal sub-domain of interest among academics. Logistics visibility, which straddles several traditional learned disciplines, is one such subject matter. Indeed, research collaboration is intense and fast becoming a requisite for success in the publication arena, which often requires multi-

disciplinary expertise. A key indicator for the success of such collaborations is the extent of co-authorship in scholarly output.

One intended outcome of collaboration is an improvement in scientific productivity. However, the literature has also highlighted the collaboration paradox which claims that collaboration seems has a positive impact on publishing productivity, particularly when it is research undertaken in developing areas such as logistics visibility in Asia. The extant literature is also replete with theoretical lenses such as the popular resource based view, and transaction cost economics theory which have been used to show that international research collaborations are more successful when complementary resources are increased and transaction costs reduced (Tang *et al.,* 2016). Clearly, this points to the choice of social networks as an important collaboration mechanism.

Empirical studies have established that logistics visibility helps manufacturers in reducing inventory and improving delivery speed, quality, and customer service whenever they share information and work with suppliers and customers. Though empirical studies on the direct relationship between logistics visibility and customer satisfaction are somewhat rare, some studies indicate the existence of indirect effects. The study by Srinivasan and Swink (2018), for instance, found that logistics visibility, when mediated by manufacturing competitive capabilities, is positively associated with customer satisfaction. Again, Biggs et al. (2017) found out that firms with higher levels of logistics visibility achieve better customer service. Whenever there is high-level logistics visibility, manufacturers usually become satisfied with materials or services provided by suppliers.

III. METHODOLOGY

3.1 Research Design

This study used a cross-sectional research design. According to Sekaran and Bougie (2016), a cross-sectional research design seeks to establish the relationship between two or more variables. Cross-sectional research design answers the what, when, how and why questions, thus giving the study a deeper meaning. The cross-sectional research design was also deemed appropriate in this study since it make it possible to employ the regression model and correlation analysis, thus enabling the testing of the hypotheses of the study.

3.2 Target Population

The target population for this study was 561 respondents drawn from the large food and beverage manufacturing firms in Kenya. According to the Kenya Association of Manufacturers, there are 187 large food and beverage manufacturing firms in Kenya. These are firms that deal with processing, value addition, packaging and distribution of food products and carbonated drinks and other ready-to-drink drinks (KAM, 2020). The unit of analysis was the 187 firms, while the units of observation were the 561 employees drawn from these firms.

3.3 Sampling and Sampling Technique

The study used a stratified random sampling technique where the respondents were categorized into strata comprising of procurement department, finance department and the production/operations department. Respondents were picked randomly from each stratum. The study utilized a sampling formula by Kothari (2017) to establish the appropriate sample size. The formula has been applauded by Taherdoost (2016); Berndt (2020); and Etikan and Bala (2017). The formula is as follows:

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2(N - 1) + z^2 \cdot p \cdot q}$$

Where:

 n = desired sample size

 N = the total population (561)

 e^2 = acceptable error (the precision level at 0.05)

 p = the proportion in the target population that assumes the characteristics being sought. In this study, a = 50:50 basis is assumed which is a probability of 50 percent (0.5).

 q = The balance from p to add up to 100 percent. That is 1-P (1 - 0.5), which in this case is 100 - 50 percent (0.5)

z^2 = number of standard deviation units of the sampling distribution corresponding to the desired confidence level of 95% which is 1.96.

Sekaran and Bougie (2016) recommended that if there are no estimates in the target population assumed to have interest, 50% should be used as the proportion of the target population with characteristics being measured. At 95% confidence level and a 5% level of significance, the sample size (n) was as follows:

n = (1.96 x 1.96) x (0.5 x 0.5) x 561

(0.05 x 0.05) x 561 + (1.96 x 1.96 x 0.5 x 0.5)

n = 228

The sample size therefore comprised of 228 respondents. Through stratified random sampling technique, the respondents were randomly picked from each stratum. This ensured equal representation of the population, where every respondent had an equal chance to be selected in the study (Taherdoost, 2016).

3.4 Data Collection Procedure

The study utilized a questionnaire to collect primary data. The questionnaire was deemed appropriate for this study since it was free from bias and it allowed the respondents adequate time to handle and respond to the questions. The questionnaires were administered by the researcher, with the help of four competent research assistants to collect data.

3.5 Data Analysis

The study used both descriptive and inferential statistics to analyze the quantitative data through the help of Statistical Package for Social Sciences (SPSS) version 27. Linear and multiple regression analyses were conducted to test the hypotheses. In adopting the 95% confidence interval, the hypotheses were considered significant if the p-value is below 0.05.

IV. FINDINGS & DISCUSSIONS

4.1 Response Rate

Out of the 205 questionnaires issued, one hundred and eighty three (183) questionnaires were dully filled returned back for analysis. This represented a response rate of 80.3% and a non-response rate of 19.7%. According to Sekaran and Bougie (2016), when a study obtains a response rate of more than 60%, it implies majority of the sampled respondents have been represented, and this could be a good representation of the population. Therefore, the study embraced the 80.3% response rate and the data was considered adequate for analysis.

Table 1

Response Rate

Response	Frequency	Percent
Successful	183	80.3%
Unsuccessful	22	19.7%
Total	**205**	**100%**

4.2 Logistics Visibility among the Manufacturing Firms

The study sought to establish the extent to which logistics visibility had been embraced by the surveyed food and beverage manufacturing firms in Kenya. To measure logistics visibility, the study used freight consolidation, transportation and lead time planning as the main sub-constructs. The findings are as shown in Table 2. The findings portrayed that majority of the respondents disagreed that their respective organizations often consolidated freight in transit to minimize time and cost (Mean = 2.44; Std. Dev. = 0.794). The respondents also disagreed that their respective organizations were proactive in planning their transportation and distribution processes to ensure proper planning of product movement (Mean = 2.31; Std. Dev. = 0.861). The findings imply that most of the surveyed food and beverage manufacturing firms in Kenya have not effectively enhanced visibility of their logistics processes, and this as elaborated by Orji et al. (2022), limits the organization' control of their logistics and their ability to optimize them for enhanced performance. As noted by Purwanto and Juliana (2022), logistics visibility is responsible for ensuring that the manufacturing entities were in a position to reduce lead time and through this enhance the satisfaction of their customers for better performance. Also the results of Rogerson and Parry (2020), they observed that the extent to which the supply chain process is aligned to conform with the logistics processes determines the effectiveness of the company's supply chain and eventually leads to enhanced performance.

Table 2
*Descriptive Statistics on Logistics Visibility*

Statements	Mean	Std. Dev.
Our organization often consolidates freight in transit to minimize time/cost	2.44	0.794
There are formulated frameworks for consolidating freight in our company	2.06	0.831
The management of freight in our organization is tasked with establishing which freight can be consolidated and those not to be consolidated	2.54	0.865
Transportation process has been enhanced to minimize delivery time	2.75	0.878
Our organization is proactive in planning its transportation and distribution processes to ensure proper planning of product movement	2.31	0.861
Our company has integrated modern transport management systems across its supply chain network	2.77	0.904
Our organization has embraced lead time management to minimize the period between customer order and fulfillment of the order	2.55	0.872
Our organization has made significant lead time planning efforts to enhance customer satisfaction	2.70	0.769
The organization has effective logistics policies and frameworks that enable the reduction of lead time	2.78	0.861
Through a visible logistics process, the firm stands a greater chance to meet customer needs and maximize performance	2.64	0.893

4.3 Performance of Food and Beverage Manufacturing Firms

The study sought to assess the performance of food and beverage manufacturing firms in Kenya. This was measured using: Sales Revenue, Profitability, and productivity of the food and beverage manufacturing firms.

4.3.1 Sales Revenue

The study compared the sales turnover for the entire manufacturing sector and the food and beverage manufacturing company. From the findings on Figure 2, it was established that the sales revenue for the food and beverage manufacturing companies decreased from Kshs.272.6 million in 2018 to Kshs.191.9 billion in 2019. During the same period, the entire manufacturing sector had increased its sales from Kshs.2.2 billion in 2018 to Kshs.2.3 billion in 2019. Between 2020 and 2021, the food and beverage manufacturing sub-sector had their total sales reduce from Kshs.354.1 billion to Kshs.281.9 million, while the entire manufacturing industry had recorded an increase in sales turnover from Kshs.2.37 billion to 2.70 billion in 2021. A further decline was recorded in the food and beverage manufacturing sub-sector to Kshs.260.03 million in 2022, whereas the entire sector grew their sales to Kshs.3.175 billion. This signifies that the food and beverage manufacturing firms have been recording a decline in their sales revenue, despite the entire manufacturing sector growing as far as sales revenue is concerned.
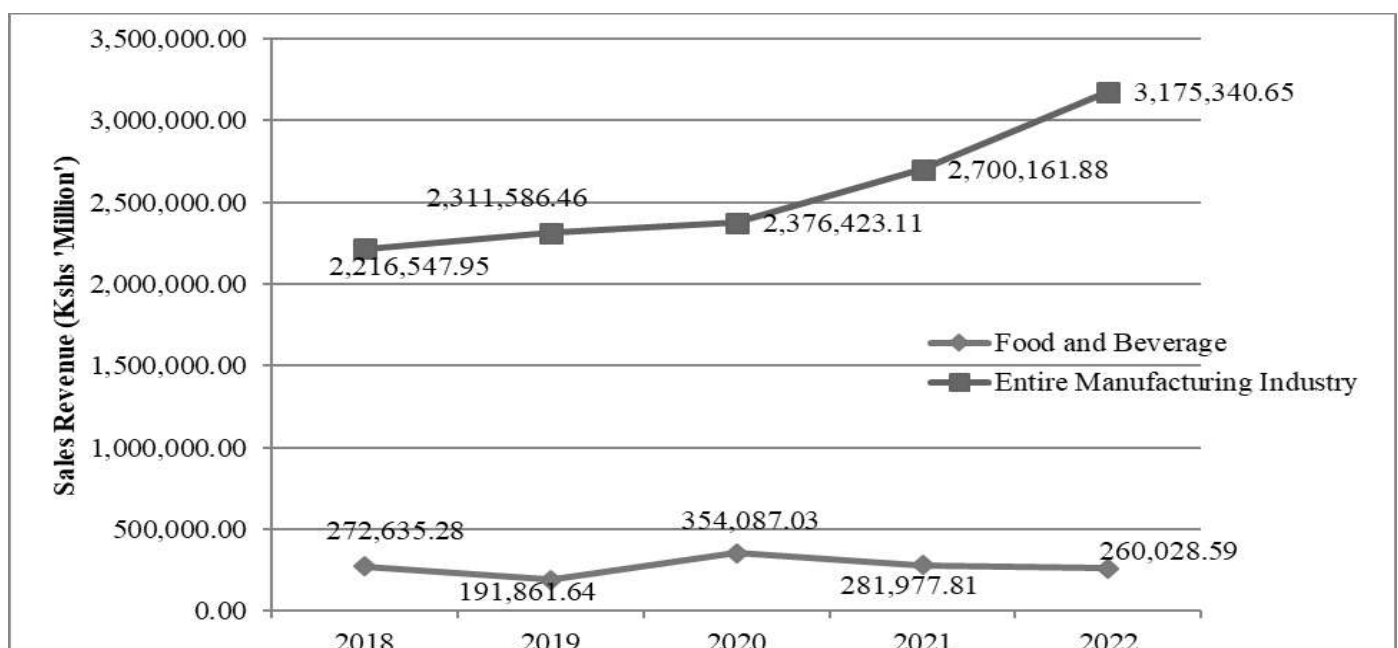
Figure 2
Annual Sales Turnover

4.3.2 Profit Margin

The research assessed the profit margins of the firms and results presented in Figure 3. The findings show that the average profit margin in the firms have been decreasing in a fluctuating way for the five consecutive years. The profit margin represents the total percentage of sales that result in a profit. Further, the profit margin gives the measure of a company's earnings (or profits) relative to its revenue.
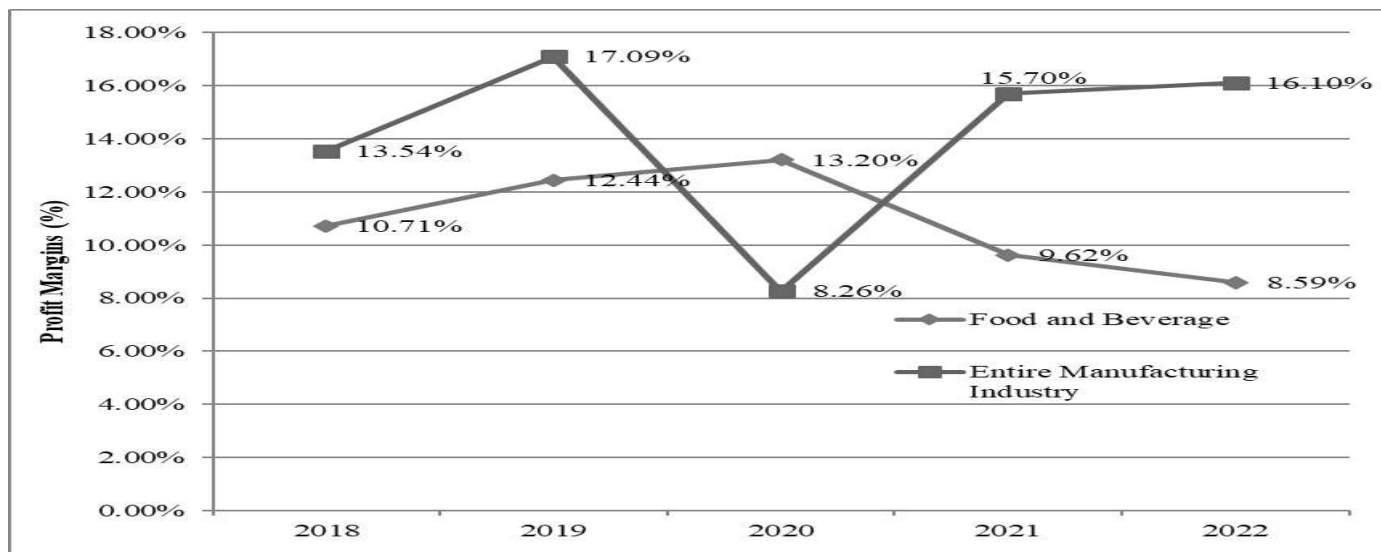
Figure 3
Annual Profit Margins

4.3.3 Productivity

On the level of productivity, it was established that while the entire manufacturing industry had a quantum index of 6.7% in 2018 while the food and beverage manufacturing firms had a 10.2%, in 2019, the entire sector declined to 3.0% while the food and beverage manufacturing firms had their production decline to negative 0.20%. In 2020, the food and beverage manufacturing sub-sector increased its production to 56% but declined to 3.0% in 2021, while in the same period (2021), the entire manufacturing sector had its productivity grow to 6.5%. The food and beverage manufacturing companies further recorded a decline of 1.1% in productivity in 2022, while the entire sector had a production index of 3.8%. From the results, it can deduced that as much as the entire manufacturing sector is facing decline in production, the food and beverage sub-sector has more decline in production, implying that the sector is indeed ailing.
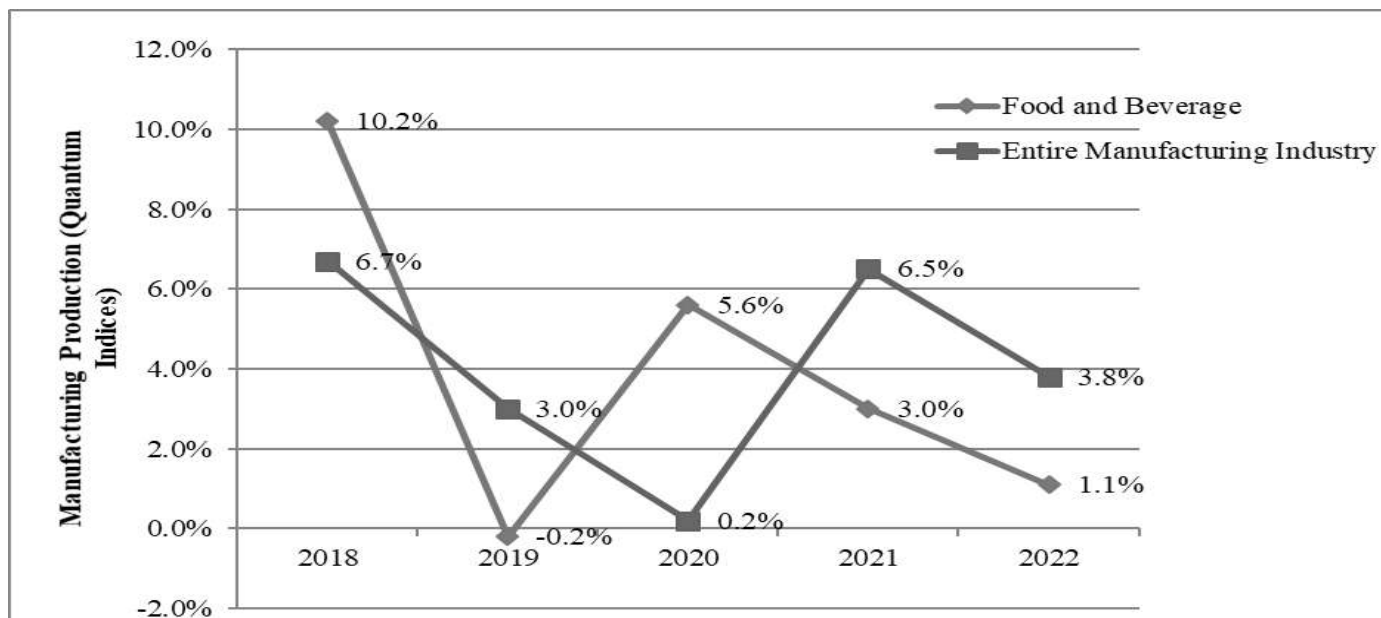
Figure 4
Production Rate for the Food and Beverage Manufacturing Firms

4.4 Correlation between Logistics Visibility and Performance of F&B Manufacturing Firms

Correlation analysis was carried out to establish the relationship between independent variable (logistics visibility) and the dependent variable (performance of large food and beverage manufacturing firms). According to Gogtay and Thatte (2017), correlation analysis tells the extent to which variables relate thus giving a glimpse on the probability of a linear relationship between the variables. The study carried out a correlation analysis to establish the relationship between logistics visibility and performance of large food and beverage manufacturing firms in Kenya. Table 3 shows that the Pearson correlation coefficient was 0.718. These findings indicate that there is a strong positive linear relationship between supply chain planning visibility and performance of large food and beverage manufacturing firms in Kenya.

Table 3
Correlation Analysis for Logistics Visibility

Variable		Performance Manufacturing Firms	Logistics Visibility
Performance of manufacturing firms	Pearson Correlation	1	.718[**]
	Sig. (2-tailed)		.000
	N	183	183
Logistics Visibility	Pearson Correlation	.718[**]	1
	Sig. (2-tailed)	.000	
	N	183	183

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

4.5 Hypotheses Testing

The hypothesis was tested using a univariate regression model as shown below:

H_O: Logistics visibility has no significant influence on performance of large food and beverage manufacturing firms in Kenya.

$$Y = \beta_0 + \beta X + e$$

The summary of the linear regression model used for this specific objective indicates a coefficient of determination, $R^2 = 0.749$ which means that about 74.9% of the change in the performance of large food and beverage manufacturing firms in Kenya can be explained by logistics visibility. The results are presented in Table 4.

Table 4
Model Summary of Logistics Visibility

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.865[a]	.749	.748	.44181

a. Predictors: (Constant), Logistics visibility

b. Dependent Variable: Performance of Large food and beverage manufacturing firms

Table 5 shows the ANOVA result of the regression of performance of large food and beverage manufacturing firms on logistics visibility. The result indicates that the significance of the F-statistic is less than 0.05 (F=17.036, p<0.05), an implication that the model is statistically significant to predict the relationship between logistics visibility and performance of large food and beverage manufacturing firms.

Table 5
ANOVA of Logistics Visibility

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	105.474	1	105.474	540.348	.000[b]
	Residual	35.331	181	.195		
	Total	140.805	182			

a. Dependent Variable: Performance of Large food and beverage manufacturing firms

b. Predictors: (Constant), Logistics Visibility

Shown in Table 6 are the coefficients and t-statistic obtained from the model. The constant term ($\beta_0 = 0.525$) is interpreted to mean that if logistics visibility is held constant, then there will be a positive performance of large food and beverage manufacturing firms in Kenya by 0.525. The regression coefficient for logistics visibility was positive

and significant (β_1 = 0.893; P = 0.000<0.05), with a t-value of 23.245. This implies that a unit increase in logistics visibility is predicted to increase the performance of manufacturing firm s by 0.893 units.

Table 6

Coefficients of Logistics Visibility

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	.525	.112		4.701	.000
Logistics visibility	.893	.038	.865	23.245	.000

a. Dependent Variable: Performance of Large food and beverage manufacturing firms

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The study concluded that logistics visibility had a positive significant influence on performance of large food and beverage manufacturing firms in Kenya. Key components of logistics visibility—freight consolidation, transportation, and lead time planning—were inadequately addressed, contributing to inefficiencies in the supply chain. Most firms did not consolidate freight to minimize time and costs, indicating a lack of structured frameworks and decision-making processes for freight management. This results in higher operational costs and delayed deliveries. Additionally, transportation systems in these organizations lack proactive planning and the use of modern transport management technologies, leading to further delays and suboptimal distribution processes. The study, therefore, concluded that while logistics visibility posed a major potential in stimulating effectiveness of supply chain processes and ultimate performance among the food and beverage manufacturing firms, the firms' inability to embrace visibility of their logistics affected their performance.

5.2 Recommendations

The management team at the food and beverage manufacturing firms in Kenya have a duty to streamline their logistics processes as a way of enhancing the visibility of logistics. This would be an integral approach towards gaining more control of their logistics through which they can contain costs, operate more efficiently and enhance customer satisfaction. There is need for the supply chain managers to come up with ways through which the firms can consolidate their freight so as to reduce costs of transportation while optimizing delivery schedules.

It is also recommended that the supply chain managers in food and beverage manufacturing firms ought to modernize their transportation systems to enable real-time tracking of trucks and cargo. Proactive transportation planning, including predictive route optimization, can minimize delivery delays and ensure timely product distribution.

The study also recommend the need for food and beverage manufacturing firms to adopt lead time management practices by implementing effective logistics policies that reduce the time between customer orders and delivery. This will not only increase customer satisfaction but also boost operational efficiency. The firms should also ensure that their supply chain processes are transparent and aligned with logistics operations. This will enhance the overall effectiveness of the supply chain, ensuring that customer needs are met promptly and improving the company's competitiveness.

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