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INTEGRATED LOGISTICS MANAGEMENT SYSTEMS AND SUPPLY CHAIN PERFORMANCE OF FOOD AND BEVERAGE MANUFACTURING FIRMS IN NAIROBI COUNTY, KENYA

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ABSTRACT

Logistics refers to the process of planning, implementing, and controlling the efficient and effective movement and storage of goods, services, and related information from the point of origin to the point of consumption, with the aim of meeting customer requirements. In the food and beverage (F&B) manufacturing industry, where products are highly perishable and supply chains are complex, the adoption of integrated logistics management systems (ILMS) has the potential to enhance agility, reduce cycle time, improve operational efficiency, and ensure timely delivery. While technological advancements in logistics can significantly streamline supply chains and reduce costs, adoption among manufacturing firms in Kenya remains limited. Reports indicate that more than half of logistics functions among firms in Kenya continue to be conducted manually, and many firms lack awareness or capacity to implement modern logistics technologies effectively. This study aimed to establish the influence of integrated logistics management systems on the supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya. Specifically, the study examined the influence of warehouse management systems, inventory management systems on supply chain performance. The study was anchored on Institutional Theory, and Unified Theory of Logistics. A census approach was employed, targeting all 51 registered food and beverage manufacturing firms operating within Nairobi County. Data were collected through structured questionnaires administered to operations managers, with a pre-test conducted among 5 respondents to ensure clarity and reliability of the instrument. Quantitative data were analyzed using descriptive statistics and multiple linear regression, with the aid of SPSS version 23. The findings revealed that warehouse management systems and inventory management systems each had a positive and statistically significant relationship with supply chain performance. The study concluded that the adoption of integrated logistics systems contributes meaningfully to improvements in supply chain responsiveness, cost control, and service delivery in the F&B manufacturing sector. Based on the findings, the study recommends that managers in the food and beverage industry prioritize investment in logistics technologies and ensure their warehouse and inventory systems are up-to-date to minimize process inefficiencies. Firms should adopt automated scheduling and routing tools to reduce delivery delays and human intervention. Additionally, training of logistics personnel on digital systems and government support through streamlined customs regulations are critical for enhancing overall logistics performance and competitiveness in the sector.

Key Words: Integrated Logistics Management Systems, Supply Chain Performance, Food And Beverage Manufacturing Firms, Warehouse Management Systems, Inventory Management Systems

Background of the Study

In the current dynamic global market, the food and beverage (F&B) manufacturing industry faces increasing pressure to streamline operations, enhance responsiveness, and meet complex customer demands. One critical strategy adopted globally is the implementation of Integrated Logistics Management Systems (ILMS), which allow firms to manage supply chain functions holistically through digitized platforms. These systems integrate core logistics components—transportation, warehousing, inventory, order processing, and distribution—into a centralized framework, offering real-time visibility and improved coordination across the supply chain (Ali & Aboelmaged, 2022). In the context of food and beverage manufacturing, where perishability, compliance with health standards, and speed to market are crucial, ILMS serve as an enabler of operational excellence and competitive advantage.

In Kenya, the food and beverage manufacturing sector plays a pivotal role in economic development, employment, and food security. Nairobi County, being the country's industrial nucleus, hosts a substantial share of F&B manufacturing firms such as Bidco Africa, Kapa Oil Refineries, Melvin Marsh International, and Coca-Cola Beverages Africa. Despite their strategic importance, these firms face persistent logistical challenges, including poor inventory visibility, delivery delays, and high operating costs. Recent studies indicate that adoption of ILMS can significantly improve supply chain performance in this sector by enhancing integration, responsiveness, and cost-efficiency (Ngatia & Osoro, 2024; Njiru et al., 2023). Yet, gaps in infrastructure, affordability of systems, and technical know-how continue to hinder widespread adoption, especially among small and medium-sized firms. As such, this study seeks to explore how ILMS influence the supply chain performance of food and beverage manufacturing firms in Nairobi County.

Statement of the Problem

The food and beverage (F&B) manufacturing sector in Kenya is a critical contributor to economic growth, employment creation, and food security. However, despite its importance, the sector is plagued by persistent logistical inefficiencies that hinder optimal supply chain performance. Nairobi County, being the hub of Kenya's food and beverage manufacturing activity, has experienced heightened logistical pressure, particularly in transportation, inventory management, order fulfillment, and distribution coordination (Njiru & Namusonge, 2023). A recent study by Jepchumba et al. (2021) revealed that over 60% of food and beverage manufacturers in Nairobi cited logistics delays and inventory inaccuracies as key factors affecting production efficiency and customer satisfaction.

These logistical challenges are exacerbated by the perishable nature of food products, complex distribution networks, and infrastructure constraints. Many firms still rely on manual or semi-digital logistics processes, leading to data fragmentation, delayed decision-making, and operational redundancies. A report by Bor (2021) emphasized that lack of integrated logistics platforms has led to an average of 18% product loss in the local food manufacturing sector due to stockouts, poor tracking systems, and supply mismatches. Moreover, the COVID-19 pandemic further exposed the fragility of supply chains in Nairobi's F&B sector, where disruptions in freight and warehousing activities caused average lead times to increase by up to 30% (Njehia, 2023).

While Integrated Logistics Management Systems (ILMS) are known globally to enhance supply chain visibility, agility, and efficiency, their adoption in Kenya remains limited. Studies show that only a small proportion of large-scale manufacturers, such as Bidco and Coca-Cola, have adopted end-to-end logistics digitalization (Mwaura, 2021). Small and medium-sized food manufacturers, which constitute the majority in Nairobi County, struggle with financial,

infrastructural, and technical capacity to implement ILMS effectively (Ngatia & Osoro, 2024). This digital divide significantly affects their competitiveness in both local and regional markets.

There is thus a pressing need to examine how the implementation of ILMS influences supply chain performance specifically within Nairobi's food and beverage manufacturing firms. While international evidence supports the benefits of ILMS in improving cost efficiency, lead time reduction, and customer satisfaction, localized empirical research remains limited. Addressing this knowledge gap is critical to informing industrial policy, investment decisions, and technological support strategies for Kenya's manufacturing sector under Vision 2030. This study, therefore, sought to investigate the relationship between integrated logistics systems and supply chain performance to provide evidence-based recommendations for improving logistics efficiency in Nairobi's food and beverage industry.

Objectives of the Study

General Objective

The general objective of this study is to establish the relationship between integrated logistics management systems and supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya.

Specific Objectives

The study was guided by the following specific objectives

i. To assess the effect of warehouse management systems on the supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya.
ii. To examine the influence of inventory management systems on the supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya.

LITERATURE REVIEW

Theoretical Review

Institutional Theory

This theory was proposed in the year 1991 by Powell and DiMaggio. The concern of this theory is the process in which structure, rules, routine and norms are developed as guidelines for behaviors that are acceptable. The actions of companies are fulfilling the requirements of the law and the customers. Both parties pressurize the organization to adopt behaviors that are environmentally responsible (Laosirihongthong *et al.*, 2023). Companies have institutionalized practices of reverse logistics as a result of both internal and external pressure. Mimetic pressures are the ones that result from copying what is done by competitors since organizations try to imitate what has been successful in other organizations similar to theirs (Cox, 2020).

The cost that is likely to be incurred by entity is reduced (Barua & Whinston, 2009). Carter, Smeltzerand and Narasimhan (1998) made an observation that organizations institutionalize practices of reverse logistics because they fear losing their share in the market to competitors and also awareness of consequences of not complying with environmental imperatives. Because of the challenges and pressure, companies are forced to put into consideration the environmental impacts as they carry on with their operations. There are three institutional mechanisms that might influence management to decide to adopt environmental management initiatives and they are: normative, mimetic and coercive (Di Maggio & Powell, 1983).

Because of normative pressures, like the requirements of customers, companies are forced to conform so that they can be considered as more legit. A number of external stakeholders can also be the source of coercive pressure on an organization, based on their powers. Companies adoption of environmental practices can be affected by government bodies through strengthen regulations. As strategy of mimicking and outperforming competition, managers might institute environmental practices that will help them to attain competitive advantage (Zhu & Sarkis, 2007). The theory indicated that within formal and informal frameworks rules, it is important to have institutional actors in the environment. Individual supporting this theory indicates that companies drive and justify their actions supporters (Dacin,2007).

This theory is considered appropriate for this study as it provides understanding on the need to adopt systems for managing logistics in SC by highlighting the forces driving institutions to have integrated operations systems based on IT. Some of the forces are normative pressures, such as customer requirements and market requirements. Due to the nature of F&B, it is imperative that logistics management systems be adopted in order to enhance survival. Thus, the theory is relevant to the study. The theory suggests that organizations should adopt logistics management systems to improve their supply chain performance.

Unified Theory of Logistics

This theory was developed by Mentzer, Min and Michelle (2004). This theory proposes that the main objective of competitive advantage in a company is creating value to its customers to satisfy the final user. Based on reviews of theories relating to companies, it was established that the role of logistics is to create a boundary spanning, coordinate capabilities of demand and supply needed by the company to create value and satisfy their customers. Logistic contribution of a company towards competitive advantage is significant in regard to efficiency and effectiveness. Some of the logistics capabilities that lead to competitive edge are management of demand interface which include the quality of logistics and service to customer, management of supply interface which include low cost of distribution and supply, and management of information capabilities which involves information sharing through IT ad connectivity.

There is another important role that is performed by logistics capabilities that is in relation to spanning of boundary interface between internal function area and focal company and SC partner. With coordination of the marketing function, logistics have the ability of differentiating product and services and offer fulfillment of requirement of customers (Mentzer *et al.,* 2004). When combined with production, logistics provide reduction in cost and investment and maintain the level of service. Through logistics capabilities, organizations are assisted in cooperating with partners of SC including distributors, suppliers and other intermediaries in order to coordinate flow of supply and demand for the purpose of delivering value to clients and in return share benefits. Therefore, logistics is an integral part of wider concept of SCM.

F&B Manufacturers logistics, particularly in-store logistics operations, determine for a large part the interaction between a customer and the retail services cape (Samli *et al.*, 2020) leading to evaluation of cognition of the service (Sandstrom, Edvardsson, Kristensson & Magnusson, 2008). It is possible for F&Bs manufacturers to differentiate what they offer if the streamline what their clients experience as they shop and make sure that their customers are satisfied with their services and are able to conveniently use their services (Sandstrom *et al.,* 2008). This study used the Unified Theory of Logistics to determine the influence of inventory management

systems on SC of F&B manufacturers in Kenya. The theory suggests the use of inventory management systems to improve organization's supply chain.

Conceptual Framework

Yin (2020) defined conceptual framework as a representation of dependents and independent variables in a form of a diagram. For this study, the independent variables will be logistic management systems (warehouse management systems, inventory management systems) and the dependent variable will be supply chain performance of F&B manufacturers in Nairobi County in Kenya. The predictor variables of logistic management systems and the response variable which is supply chain performance are presented in Figure 2.1.

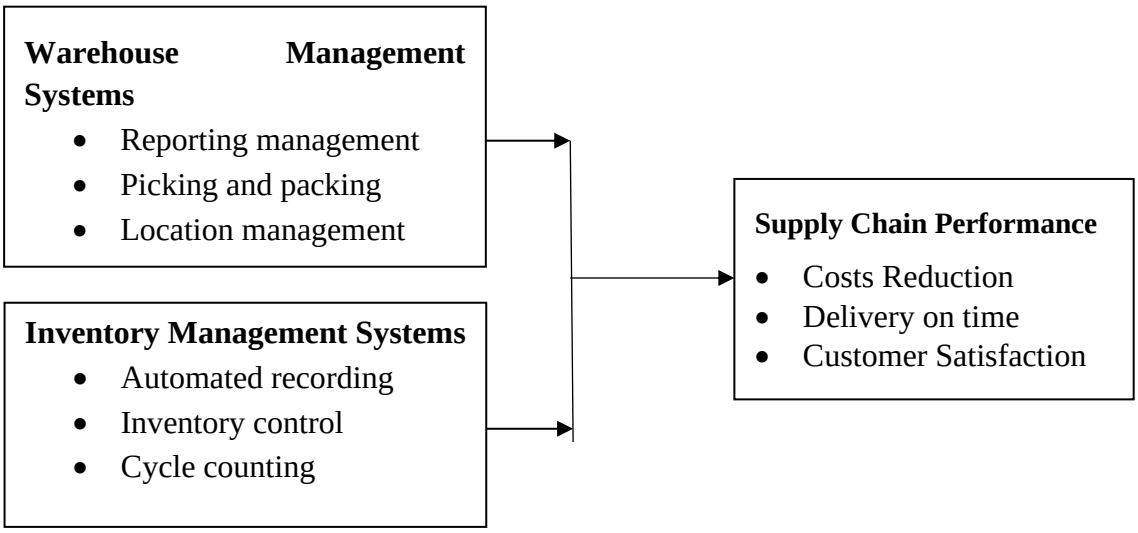

Figure 2.1: Conceptual Framework

Warehousing Management Systems

Warehousing management systems is the use of technology in managing warehousing activities that involves storage or holding of raw materials, semi-finished/finished goods for different time periods as well as retrieval. Bhat (2021) explains the warehousing roles which include consolidation. It means collecting smaller quantity of goods and combining them in order to form large quantity for the purpose of lowering transportation cost. Some of the e-warehouse management systems are M2M, Order Fulfillment Optimization Technology, pick to light systems, put to light systems and warehouse robotics technology.

Machine-to-Machine Technology (M2M) helps in monitoring and streamlining all automated aspects of operations in the warehouse. Combining it with WMS, newest eases equipment control of all equipment that are important in fulfilling a process in the warehouse. Order Fulfillment Optimization Technology on the other hand helps in maximizing productivity of order picking and boosting accuracy. Two key solutions exist; Pick-by-Light and Put-by-Light (Fan, Zhang& Zhang, 2020).

Pick-to-Light Systems applies the use of special light displays in directing warehouse operators to where products are located. This makes it much easy for operators to know the products they are to pick and the quantity. One of the characteristics of the systems is that they are very flexible and the technology has the ability of planning, controlling and analyzing volumes of picked orders. On the other hand, Put-by-Light systems help in directing operators on where

and how they should allocate products in a warehouse. The systems are very efficient when it comes to picking from a bulk stock. This technology is considered ideal for retailing warehouse dealing with apparel, sporting goods, convenience foods, personal care items, general merchandise and groceries.

This technology assists in collecting and trading information and provides managers of the warehouse with actionable information which can be applied in verifying operation procedures and expedites decisions (Bondarev & Zakirov, 2020). Another warehousing technology is the Voice Tasking Technology which is technology that is free of hands and applies the use of spoken command to pick, put, receive, replenish and ship the functions of the warehouse. The technology is similar to RF technology and has a flexible choice for fulfilling orders.

For the out bound logistics system, the warehouse receives consolidated volume of shipments from different plants and ship LTL to various markets. Owino (2023) further argues that it is important for the products be readily available to be delivered to customers on demand. By warehousing a product close to the customers, delivery time can be reduced, or off-the shelf supply can be achieved thereby improving customer's services. The faster, on time delivery can help increase sales.

Inventory Management Systems

Inventory refers to the total amount of material/commodity that is contained in a warehouse at any particular time. It could be the total amount of commodity and the action of counting them (Wisner et al., 2022). Tracking as well as management of commodities relate with systems of managing inventory and they include monitoring commodities that are moved into and out of the warehouse and reconcile with inventory balanced electronically.

The role played by inventory management is very important in providing efficient health care related to the three important aspects of medical supplies applied in health facilities which are availability, affordability and safety. In the organization, all policies on inventories should be beneficial in driving operational period, expenses and work the requirements of capital (Cox, 2020).

Miller (2020) indicated that management of inventory is inclusive of all activities that are put in place to make sure that customers have the products and services they need. It is responsible for coordination of purchases, manufacturing and distribution functions to meet the needs of marketing and those of the organization in order to avail the products and services needed by customers. Management of inventory is involved primarily with specifying size and placement of goods that have been stocked. Management of inventory is needed in various locations in the faculty or various locations of supply network for protecting the regular and planned production from materials depletion.

Inventory management scope also involves managing replenishing lead time, returns, goods and defected goods and predicting of demand, carrying inventory costs, manage asset, physical inventory, availability of physical space, valuation and visibility of inventory, predicting the future price of inventory and management of quality. It is possible to reach the optimum inventory level by balancing all the needed requirements, which is a continuous process (Ogbo & Onekanma, 2024).

Supply Chain Performance

SC performance is considered to be the level in which activities of SC are effective and efficient to make sure the goals and objectives of the company are attained. Li (2023) explained performance of SC as excelling operations in the delivery of leading experience of clients. SC performance is affected by both internal and external factors of the company. There is a broad

classification of SCM in two groups; qualitative which measures aspects such as level of customer satisfaction and quality of products and the qualitative measures for aspects such as lead time for order-to-order, flexibility, response time, utilization of resources and performance delivery.

Measuring performance of SC refers to the process of evaluating returns from practices of SC and can be conducted by considering the way SC exhibits flexibility, sustainability, conformity and extremity (Whitten *et al,* 2022). It is important for SC to have the ability of reacting to changes in either demand or supply quickly and handle smoothly any disruptions. SC Flexibility is being able to adjust to the design of SC meeting any shifts in structure of the market and modifying supply network to show change in strategies, product and technology. It is important to make sure that SC is in line with stakeholders and partners interests in SC of the organizations. The most important factor is that SC need to assist in decreasing long term risk that relate to diminishing resources, fluctuating costs of energy, liabilities of products, pollution and management of waste.

Wisner, Tan and Leong, (2022) indicated that systems that measure performance for SC should have effective link with trading partners of the SC in order to attain a breakthrough performance to satisfy the final user. Implying that, for example in health care institutions SCM needs to be hyper-responsive to continuously changing needs, aspirations, and expectations of patients and the final user in order for them to realize effective performance measures. Sweeney (2021) asserted that the system should focus on creation of value for the final users. Traditional measures of performance include profitability, revenue and cost and these measures are no longer sufficient to determine effective performance. Four key areas in determining performance of SC in institutions of health care were determined and they were: financial performance, quality of care, adaptation to the environment, and operational efficiency.

Empirical Review

Warehousing Management Systems (WMS)

Udeh and Karaduman (2020) did a research study on effects of SC in management systems of warehouse in automotive industry in Turkey. The study did measure the effects of improved WMS in SC of automotive industry. The study used a sample of 14 manufacturers of automotive who operate as Original Equipment Manufacturers and Automotive Components Manufacturers with the key focus being on production capacity, yearly sales, share in the market according to the company's annual report of 2023/2024. It was established that SCM in WMS assisted in improving efficiency and effectiveness of the entire company through lowered operational costs, inventory levels and increased responsiveness to demand and therefore improving the organizational competitive advantage.

Mukolwe and Wanyoike (2020) conducted a research study with the aim of establishing the impacts of practices of e-logistics management on efficiency of operations in Mumias Sugar Company Limited, Kenya. The study selected a sample of 92 respondents using purposive sampling technique from each strata of the population. The study drew the sample from various departments in the company who represented the farmers, officials from Ministry of agriculture and Kenya Sugar board. Selected data collection tool was questionnaire. It was established that automating warehouse activities leads to improved accuracy, speedy operations and lowered wastage. It was therefore recommended that there needs to be strategic approach in practices of managing logistics by embracing modernized technology and training of employees.

Ramaa, Subramanya and Rangaswamy (2022) researched the effect of WMS on India's SC. The focus of the study was on the largest retail company dealing with consumer products. Sample used in the study was 60 retailing organizations and found that retailing companies

with automatic WMS had witnessed reduction in cycle time to 773 minutes. Mungu (2023) carried out a research study with the aim of determining how application of practices of managing logistics can affect the level of stocks of essential drugs in public health institution. The study was conducted in the county of Bungoma where a sample of 15 health institutions was surveyed. It was found that practices of managing inventories, transport, and warehouse like quality control, labeling, clear specialization and pricing had positive impacts on level of stocks of essential drugs in the facilities.

Inventory Management Systems

Osei-Mensah (2022) carried out a study to assess the impacts of practices of managing inventories on delivery of service at St. Martin's Catholic Hospital. Research design applied was descriptive and a sample of 60 employees was used. Questionnaire was the selected data collection tool. From the findings, it was established that hospitals make sure that agreements made with suppliers for short cycle deliveries predict accurately the dates for supplies to be delivered and operating Materials Requirements Planning system (MRP). It was also found that hospitals make sure that as a way of managing inventories they partner with strategic supplier and applies strict the use of IT in its practices of managing inventories.

Atnafu and Balda (2020) studied effects of practices of managing inventories on competitiveness of organizations as well as their performance: Empirical evidence from Ethiopia's MSEs. The focus of the study was examining empirically the effects of practices of managing the inventory on competitiveness of organizations and their performance. A sample of 188 MSEs was used in the study; the sample was selected from organizations that operated in manufacturing sub-sector and the association and hypothesis were tested with the use of SEM. It was found that increased levels of practices of managing inventories can result to improved competitive advantage and performance of the organization. It was also found that competitive advantage has a positive effect on performance of the organization.

Mwangi (2023) studied management of inventories and performance of SC of NGOs in Kenya's agricultural industry. It was found that practices of managing inventories were significantly related with performance of SC. It was also found that 73.2% variation in performance of SC could be attributed to EOQ, JIT, order batching, marginal analysis, inventory of vendor managed, ABC analysis and simulation. The study also found that in order for the organization to attain high level of performance in its C it is important for them to encourage the following practices: close relationship with customers and partners, suppliers prequalification, holding safety stock, tools for e-procurement, JIT, stringent agreements on grant and knowledge regarding techniques of managing inventories.

RESEARCH METHODOLOGY

This study adopted descriptive research design with the aim to access the general intents of the study. This research design involves set of techniques and procedures describing the intended variables with the use of statistical logic. Borg and Crall (2009) defined target population as set of elements, subjects, people that are well defined and are researcher's focus in making generalization of the findings. A report from the Nairobi County government indicates that there are 51 F&B manufacturers in Nairobi County. The study focused on Nairobi County because most F&B manufacturers are located there and they are easily accessible. The unit analysis was the F&B manufacturers in Nairobi County. The unit of observation was the operations manager of the 51 F&B manufacturers located in Nairobi. This was a census study where all the 51 manufacturers of the F&Bs in Nairobi were used.

The study used the census method to select 51 manufacturers of the F&Bs in Nairobi, thus the sample of the study was 51 respondents. In this method each and every item in the universe is selected for the data collection. The study collected data for each and every unit of the population. The unit of observation was operations managers who made up 51 respondents.

Primary data was used in the study. The study used questionnaires to collect data. Orodho (2008) argues that for structured surveys, tested and well standardized questionnaires are the most effective. The analysis of the data was guided by the research objectives. The data collected from the field was analyzed using SPSS 23 program. The questionnaires were referenced and the items in them coded for easier data entry. The study had both qualitative and quantitative data. To analyze this data, descriptive statistics wer used by use of questions that are closed ended. The use of descriptive analysis is the foundation of experimental and correctional studies. They give clues on issues that should be looked into which leads to further research in an area (Mugenda & Mugenda, 2008). Qualitative data was analyzed using content analysis and SPSS was used in analyzing qualitative data. Information collected was cleaned, coded, categorized in line with each of the variables of research. Pearson R correlation was used to measure strength and the direction of linear relationship between variables. Multiple regression models were fitted to the data in order to determine how the predictor variables affect the response variable

RESEARCH FINDINGS AND DISCUSSIONS

The sample selected for the study was 51 managers of F&B manufacturers, from which 47 of them filled and returned the questionnaire, which translated to a response rate of 92.2%. According to Mugenda and Mugenda (2008) the response rate of 50% is considered to be adequate; rate of 60% is considered to be good while a rate of 70% and above is considered to be excellent. Therefore our response rate was excellent

Descriptive Analysis

In this section, the respondents were asked to indicate their opinion of how various aspects of logistics management systems affected supply chain performance of food and beverage manufacturers. A 5-point Likert scale was used where 1 was strongly disagree, 2 was disagree, 3 was moderate, 4 was agree, and 5 was strongly agree. The results are presented in subsections below where means and standard deviation values were used to interpret the findings. A mean of 0-1 implied that the respondents strongly disagreed, a mean of 1.1-2 implied they disagreed, 2.1-3 suggest that they were neutral, a mean of 3.1-4 suggest they agreed, and a mean of 4.1-5 implies the respondents strongly agreed. A standard deviation greater than 2 suggests a great standard deviation implying that the respondents had differing opinions while a value less than 2 suggests respondents opinions were in agreement.

Warehousing Management Systems

Respondents gave the level they agreed/disagreed with statements on effects of Warehousing Management Systems on Supply chain performance. Table 1 shows the results.

Table 1: Warehousing Management Systems on Performance of Supply chain

Statement	1	2	3	4	5	Mean (M)	Std. Dev. (SD)
Warehouse management system helps to reduce picking errors	1	1	1	38	6	3.982	1.37
Warehouse management system facilities the maximum use of storage space	1	1	3	38	4	3.889	1.381
Warehouse management system helps to optimize stock control	2	2	3	36	4	3.777	1.275
Warehouse management system improves work productivity	3	1	4	36	3	3.738	1.32
Warehouse management system guide workers through risk assessments and flag up warehouse safety requirements	1	2	7	36	0	3.698	1.331

From the findings presented in table 1, the respondents were in agreement that warehouse management system helps to reduce picking errors (M=3.982, SD=1.37); warehouse management system facilities the maximum use of storage space (M=3.889, SD=1.381); warehouse management system helps to optimize stock control (M=3.777, SD=1.275); warehouse management system improves work productivity (M=3.738, SD=1.32); and that warehouse management system guide workers through risk assessments and flag up warehouse safety requirements (M=3.698, SD=1.331). The study findings concurs with Udeh and Karaduman (2020) who established that Supply Chain Management in Warehouse Management System assisted in improving efficiency and effectiveness of the entire company through lowered operational costs, inventory levels and increased responsiveness to demand and therefore improving the organizational competitive advantage. It also concurs with findings of Mukolwe and Wanyoike (2020) that automating warehouse activities leads to improved accuracy, speedy operations and lowered wastage.

Respondents further explained the challenges faced in the use of technology to manage warehousing practices. They indicated that most of the challenges that their warehouse faced like high cost of labor, process redundancy and inaccurate inventories is solved by having a robust system. Therefore, it is the responsibility of the managers to ensure they remain informed on the changes in the market to ensure that their ware house management system is up-to-date. Another challenge is lack of integration between scales and warehouse management systems. This occurs when scales and weights are taken manually to be entered in WMS later; this technique is prone to errors. The other challenge is manually dimensioning Pallets and Boxes; doing this manually increases the error. There is also the challenge of low adoption of mobile technology; considering that this industry is all about movement; there has been stagnation in computing powers across small and mid-sized warehouses. Unreliable Warehouse Wireless is a common challenge; this can be resolved by decision makers putting into consideration that warehouses are unique they are not like the regular office/home environment they require industrial grade access points with high gain antennas.

Inventory Management Systems

Respondents indicated the level to which they agreed or disagreed with statements on the effects of inventory management systems on performance of supply chain. Table 2 presents the findings obtained.

Table 2: Inventory Management Systems on Performance of Supply Chain

Statement	1	2	3	4	5	Mean (M)	Std. Dev.(SD)
Inventory management systems promotes improved supplier, vendor, and partner relationships	1	1	1	40	4	3.961	1.476
Inventory management systems enables the company to maintain a centralized record of every asset	1	1	3	35	7	3.948	1.263
Inventory management systems helps in reduction in storage costs	1	2	1	37	5	3.915	1.343
Inventory management systems helps to keep track on current stock levels which enables the company to reorder with greater accuracy	1	1	4	37	4	3.863	1.326
Inventory management systems promotes better reporting and forecasting capabilities	2	1	5	34	5	3.836	1.22

From the findings presented in Table 2, the respondents agreed that inventory management systems promotes improved supplier, vendor, and partner relationships (M=3.961, SD=1.476); inventory management systems enables the company to maintain a centralized record of every asset (M=3.948, SD=1.263); inventory management systems helps in reduction in storage costs (M=3.915, SD=1.343); inventory management systems helps to keep track on current stock levels which enables the company to reorder with greater accuracy (M=3.863, SD=1.326); and that inventory management systems promotes better reporting and forecasting capabilities (M=3.836, SD=1.220). The study findings agrees with the findings of Atnafu and Balda (2020) that increased levels of practices of managing inventories can result to improved competitive advantage and performance of the organization. It was also found that competitive advantage has a positive effect on performance of the organization.

Respondents explained the challenges faced in the use of technology to manage inventory practices. There is the challenge of inefficient process; despite the advancement in technology, most of the companies still use inventory management systems that are outdated. This can be mitigated by upgrading operation standards and implementation of new technology and software. Losing of inventory data is a common challenge that most organizations face. This challenge can however be mitigated by having a backup of the inventory data. There will always be issues even if the company has the most updated inventory management system. Therefore, there is need for transparency; if a customer is aware that there are some delays, they will change their expectations. Therefore communication and transparency is key to customer confidence and loyalty with the company. Another challenge with inventory management is increased competition. There are emerging economies like China and India and they provide advantage like cheap labour cost, and material cost. With international shipping available, it is necessary to make sure that company's supply chain is efficient.

Supply Chain Performance

Respondents indicated the level to which they agree or disagree with statements on supply chain performance in F&B manufacturers in Kenya. Table 3 presents the findings obtained.

Table 3: Supply Chain Performance in F&B Manufacturers in Kenya

Statement	1	2	3	4	5	Mean (M)	Std. Dev.(SD)
The logistic management systems has improved customer satisfaction since products are delivered on time	1	2	4	32	8	3.961	1.149
The logistic management systems helps in reducing operating costs	2	2	2	33	8	3.955	1.199
The logistic management systems ensures that products are delivered on time	2	2	1	37	5	3.902	1.345
The logistic management systems has led to reduced supply chain costs	2	1	5	34	5	3.836	1.207

The findings in table 3 show that the respondents agreed that the logistic management systems has improved customer satisfaction since products are delivered on time (M=3.961, SD=1.149); the logistic management systems helps in reducing operating costs (M=3.955, SD=1.199); the logistic management systems ensures that products are delivered on time (M=3.902, SD=1.345();and that the logistic management systems has led to reduced supply chain costs (M=3.836, SD=1.207). The study finding concurs with Sillanpää (2020) that supply chain performance measurement is extremely important in developing supply chain. It also concurs with Reddy, Rao and Krishnanand (2019) that simulation techniques were more suitable than other performance techniques and approaches for the supply chain performance measurement in a volatile environment.

Correlation Analysis

The strength and direction of relationship between two variables is determined by computing correlation analysis. The study correlated warehouse management systems, inventory management systems, and supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya.

Table 4: Correlations

		Supply Chain Performance	Warehouse Management	Inventory Management
Supply Chain Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	47		
Warehouse Management Systems	Pearson Correlation	.611*	1	
	Sig. (2-tailed)	.004		
	N	47	47	
Inventory Management Systems	Pearson Correlation	.698	.179	1
	Sig. (2-tailed)	.006*	.228	
	N	47	47	47

The findings, as indicated in Table 4, show a strong and statistically significant relationship between warehouse management systems and supply chain performance ($r = 0.611$, $p = 0.004$). This suggests that improved warehouse processes—such as real-time inventory updates, space optimization, and automated stock retrieval—contribute significantly to efficient supply chain operations. These findings are consistent with the work of Ngatia and Osoro (2024), who emphasized that warehouse systems significantly influence inventory turnover rates, order

fulfillment speed, and cost control in food manufacturing firms. Additionally, Saryatmo and Sukhotu (2021) highlighted that advanced warehouse management systems enhance operational visibility and responsiveness, particularly in perishable goods sectors like food and beverage. Thus, the study affirms that well-integrated warehouse systems are pivotal in improving delivery accuracy and reducing holding costs in the sector.

The study also established a strong positive and significant relationship between inventory management systems and supply chain performance ($r = 0.698$, $p = 0.006$). This underscores the importance of accurate demand forecasting, stock-level monitoring, and automated replenishment in enhancing supply chain responsiveness and reducing product loss through spoilage or overstocking. These results are in line with Christian et al. (2024), who found that digital inventory control systems in Nigerian food firms significantly reduced waste and improved order lead times. Similarly, Mbugi and Lutego (2022) concluded that automated inventory systems allow firms to balance inventory availability with production scheduling, a critical factor in minimizing downtime in food processing. Therefore, effective inventory systems contribute directly to cost efficiency and customer service in food and beverage supply chains.

Regression Analysis

Regression Analysis for Warehouse Management Systems

The first objective of the study was to establish the effect of warehouse management systems on supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya. The regression model for Objective 1 was $Y= \beta o + \beta_1 X_1 + \varepsilon$.

Table 5: Regression Analysis for Warehouse Management Systems

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.611[a]	.373	.369	5.49123

a. Predictors: (Constant), Warehouse Management Systems

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	276.022	1	276.022	9.154	.004[b]
	Residual	1356.914	45	30.154		
	Total	1632.936	46			

a. Dependent Variable: Supply Chain Performance
b. Predictors: (Constant), Warehouse Management Systems

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.147	0.181		6.337	.000
	Warehouse Management Systems	.535	.177	.611	3.026	.004

a. Dependent Variable: Supply Chain Performance

From the fining presented in table 5, the value of adjusted R^2 was 0.369 which implies that 36.9% of variations in supply chain performance can be attributed to changes in warehouse management systems. The remaining 63.1% variations can be attributed to other aspects other than change in warehouse management system. The findings also show that warehouse

management system and supply chain performance are strongly and positively relates as indicated by a correlation coefficient (R) value of 0.611.

From the Anova findings, the p-value obtained was 0.004 which is less than 0.05, an indication that the model was significant. The findings also show that the f-calculated value was 9.154 which is greater than the F-critical value ($F_{1,45}$=4.057). Since the f-calculated value is greater than the f-critical value it shows that the model is reliable and can be used to predict supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya.

From the coefficients table, the following model was fitted;

$$\mathbf{Y= 1.147 + 0.535X_1 + \varepsilon}$$

From the equation above, when warehouse management system is held to a constant zero, performance of supply chain will be at a constant value of 1.147. The findings also show that a unit increase in warehouse management system will lead to a 0.535 increase in supply chain performance in F&B in Nairobi. The findings also show that the t-statistic (3.026) has a p-value (0.004) which is less than the selected level of significance (0.05). Therefore we conclude that warehouse management systems positively influences supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya.

Regression Analysis for Inventory Management Systems

The second objective of the study was to determine the influence of inventory management systems on supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya. The regression model for this equation was $Y= \beta o + \beta_2 X_2 + \varepsilon$.

Table 6: Regression Analysis for Inventory Management Systems

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.698[a]	.487	.473	5.52673

a. Predictors: (Constant), Inventory Management Systems

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	258.424	1	258.424	8.461	.006[b]
	Residual	1374.512	45	30.545		
	Total	1632.936	46			

a. Dependent Variable: Supply Chain Performance
b. Predictors: (Constant), Inventory Management Systems

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.706	0.418		4.081	.009
	Inventory Management Systems	.525	.181	.698	2.909	.006

a. Dependent Variable: Supply Chain Performance

From the fining presented in table 6, the value of adjusted R^2 was 0.473 which implies that 47.3% of variations in supply chain performance can be attributed to changes in inventory management systems. The remaining 52.7% variations in supply chain performance can be

attributed to other aspects other than change in inventory management system. The findings also show that inventory management system and supply chain performance are strongly and positively relates as indicated by a correlation coefficient (R) value of 0.698.

From the Anova findings, the p-value obtained was 0.006 which is less than 0.05, an indication that the model was significant. The findings also show that the f-calculated value was 8.461 which is greater than the F-critical value ($F_{1,45}$=4.057). Since the f-calculated value is greater than the f-critical value it shows that inventory management system is reliable and can be used to predict supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya.

From the coefficients table, the following model was fitted;

$$\mathbf{Y= 1.706 + 0.525X_2 + \varepsilon}$$

From the equation above, when inventory management system is held to a constant zero, performance of supply chain will be at a constant value of 1.706. The findings also show that a unit increase in inventory management system will lead to a 0.525 increase in supply chain performance in F&B in Nairobi. The findings also show that the t-statistic (2.909) has a p-value (0.006) which is less than the selected level of significance (0.05). Therefore the study concludes that inventory management systems positively influences supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya.

Conclusions

The study found that warehouse management systems have a positive influence on Supply chain performance. The study also established that the influence was significant. Therefore, improvements in warehouse management systems will results to an increase in Supply chain performance of F&B in Kenya. Based on the findings, the study concluded that warehouse management systems positively and significantly influences Supply chain performance of F&B in Kenya.

The study found that inventory management systems have significant relationship with Supply chain performance. The study further found that the influence of inventory management systems on supply chain performance is seen to be positive. Therefore improvement in Inventory management systems will result to an increase in supply chain performance of food and beverage manufacturing firms in Nairobi County, Kenya. Based on the findings, the study concluded that inventory management systems positively and significantly influences Supply chain performance of F&B in Kenya.

Recommendations

Recommendations for Warehousing Management Systems

When warehouse management systems are improved, supply chain performance of the company improves as well. The study recommends management of the company to ensure they remain informed on the changes in the market to ensure that their warehouse management system is up-to-date and therefore avoid process redundancy and inaccurate inventories. There is a need to use strategic approach in practices of managing logistics by embracing modernized technology and training of employees on the use of the same. There is also need for the management of the company to ensure that there is reliable Warehouse Wireless; this can be resolved by decision makers putting into consideration that warehouses are unique they are not like the regular office/home environment and therefore, they require industrial grade access points with high gain antennas.

Recommendations for Inventory Management Systems

Improving inventory management results to improved supply chain performance in the company. The study therefore recommends the company to adopt new technology (updated inventory management system) to ensure that the processes in the company are efficient; this can be achieved by upgrading operation standards and implementation of new technology and software. Because of technological itches, it is possible for the company to lose data, therefore it is recommended that the company should always have backup of inventory data. Further, the company should ensure they are transparent with their customers to avoid losing them to other competitors especially emerging economies like China and India.

Suggestions for Further Studies

The general objective of this study was to establish the relationship between logistics management systems and supply chain performance of food and beverage manufacturers in, Kenya. The study was limited to food and beverage manufacturers; the study therefore recommends replication of the research study in other manufacturing companies such as textile industry. The study was also limited to supply chain performance; the study recommends a study to be conducted on the influence of logistics management systems on financial performance of food and beverage manufacturers in, Kenya.

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