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LOGISTICS MANAGEMENT SYSTEMS AND PERFORMANCE OF FAST-MOVING CONSUMER GOODS MANUFACTURERS IN NAIROBI, KENYA

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Abstract

Purpose: The purpose of this study was to establish the relationship between logistics management systems and supply chain performance of fast-moving consumer goods manufacturers in, Kenya

Methodology: The study used descriptive research design was The study targeted the operations managers of the 51 FMCG manufacturers located in Nairobi. The sample size was 51 respondents who were selected using the census method. Questionnaires were used for data collection. For comprehension, logic and relevance, 5 respondents were used in pre-testing the questionnaire. Descriptive statistics will be used to analyze quantitative data. In order to test the significance of the effect of the predictor variables on response variables, the study used multiple linear regressions. Data collected was analyzed using SPSS version 23 and presentation of the findings done using figures, tables and charts.

Results: The study found that warehouse management systems positively and significantly influences Supply chain performance of FMCG in Kenya; inventory management systems positively and significantly influences Supply chain performance of FMCG in Kenya; transportation management systems positively and significantly influence Supply chain performance of FMCG in Kenya; clearing and forwarding management systems have positive significant relationship with Supply chain performance of FMCG in Kenya; and information technology has a positive significant influence on the relationship between logistics management systems and supply chain performance of FMCG manufacturers in Kenya.

Unique contribution to theory, practice and policy: 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. Companies should automate their scheduling process this will lead to fewer interventions by the management and therefore lowering any chances of delays. It is also important for the government to ensure that there are clear regulations by custom department and ensure that the employees in this department are well knowledgeable of their task and are well organized and motivated to conduct their duties.

Key words: *Logistics Management Systems, Supply Chain Performance, Fast-Moving Consumer Goods Manufacturers*

1.0 INTRODUCTION

The process where planning, implementation and control of movement of goods and services and other information that relates to them is done in an efficient and effective manner with the aim of meeting the requirements of customers is referred to as logistics (Vitasek, 2013). Because of dynamic nature of the markets and competition in provision of products and services businesses have been forced to be innovative in delivering service to their customers and revolutionize how they do their business. Logistics involves materials as well as information that flow in the organization. This is inclusive of everything from products, to services, managing raw material, production, storing finished products, delivery and aftersales services (Ittmenn & King, 2010).

Zaheed, Abdullahil and Choudhury (2016) referred supply chain (SC) performance as the level to which manufacturer strategically collaborates with SC partners and manages collaboratively intra and inters processes of the organization with the aim of achieving effective and efficient flow of products and services, money, information as well as decisions providing maximum value to its clients. Hasapidis (2011) emphasized on the advantages of measurements of SC in order to have successful SCM. With the use of measurements of customer satisfaction, businesses have been able to compete in a more effective manner in its targeted mission. The feedback of customers provides a platform to strategically align the resources of the organization to meet what the clients expect. Four measures applied in SC performance are efficiency, responsiveness, flexibility and quality. Flexibility is the ability of SC to respond to changes in the market place with the aim of gaining or maintaining competitive advantage (Su *et al.,* 2015).

In Australia, a report provided by Bureau of Transport Economics (BTE) (BTE 2011) indicated that the economy of Australia is greatly affected by logistics system's performance: it had influence on the structure of cost and Australia's producers' revenue, their competitiveness in time of delivery and quality of products and responsiveness of producers to requirements of customers. Wilson (2017) did note that changes in the logistic service in the US from simple means of reducing cost of transport cost to one stop solution to service encompassing transport, storage, consultation and management of information. Because of globalization, ability of responding to the requirements of customers fast is important to have sustainable competitive advantage.

Organization performance is described as the way in which a firm accomplishes its market-based objectives and additionally its financial objectives (Chesire & Kombo, 2015). Performance is an ongoing process and flexible procedure which includes manager and those they manage. They take a role of partners in a system created to empower them accomplish the required outcomes. Practicing strategic management can be supported as long as it enhances the firm's performance. Performance in itself is the final product of the activities that it incorporates and the actual outcome of the strategic administration process. Organizational performance is attainment of ultimate goals of the organization as set out in the key Organizational plans (Wheelen & Hunger, 2013).

Fast-Moving Consumer Goods Manufacturers (FMCG) are the products that sell very fast without incurring a high cost. They can also be defined as the essential or nonessential goods that are purchased frequently (Mandrinos, 2014). There is a wide range of products that are classified as FMCGs, which include soaps, shaving products, toiletries, detergents, soft drinks, processed

foods, consumables, glassware, batteries, cosmetics, and plastic goods among others (Wasonga, 2012). The shelf life of FMCG products is very short. There short shelf life is partly attributed to the fact that most of these products are perishable and get bad rapidly. For instance, FMCGs such as fruits, meat, baked goods, and vegetables are highly perishable. From the marketers' point of view, FMCG also has extensive distribution network (Nyaga, 2014).

The distribution chain for FMCG is the interdependent collection of processes and related resources. They include manufacturers, warehouses, suppliers, logistics service providers, wholesalers and distributors and all the other parties within the supply chain network. The Kenya's FMCG has been experiencing faster growth in the last few decades. The growth of the industry has resulted in many companies, both local and foreign entering the industry to take a share of the market (Wasamba, 2008). Currently, there are many FMCG manufacturing companies in Kenya based in Nairobi. Some of the companies are Interconsumer Limited, Bidco Oil Refineries, Kapa Oil, Finlay, Kenya Seed Company, Kenya Nut Company, Dawa Group, Maisha Flour Mills, Melvin Marsh International, Nestle Foods Kenya, Eveready East Africa, Premier Food Industries, Proctor & Allan (E.A), Coca-Cola, PepsiCo, Ramzco, and HACO Industries (K) among many others (Njambi & Katuse, 2013). These among other companies manufacture a variety of FMCG that is sold both locally and internationally.

Currently, Bidco is the largest FMCG in Kenya commanding about 24% of Kenya's oil and fat products (Euromonitor, 2015). In this segment of the FMCG, they are followed by Kapa Oil Refineries that controls about 12% of the market share while Unilever Kenya comes third with 9% with the ranking done according to production capacity (Euromonitor, 2015). Like in other countries, some of the former Kenyan FMCG giants are facing hard times due to increased competition and technological advancements that have rendered some of the products obsolete (Wasonga, 2012). There is also a challenge with complex logistics management especially due to the high distribution network at a faster speed. For instance, Eveready East Africa, which was once a leader in FMCG in Kenya, collapsed and exited the Kenyan market due to high costs and poor performance (KAM, 2017).

1.1 Statement of the Problem

Under logistical supply chains, speed is of the essence hence the time from picking to delivery of outputs to customer's point of collection is very critical when it comes to quality customer service and satisfaction. It is the responsibility of logistic managers manning supply chains to ensure that both inputs and outputs get to where they are required within the shortest time and in the right quantity in order to satisfy customer's needs. According to statistics, it is estimated that in Kenya, 90% of logistic related processes in companies are done manually (Miheso, 2013). Mitullah and Odek (2010) indicate that a significant number of firms in Kenya are still lagging behind in the use of information technology incorporation in logistics management. KAM (2017) states that it is disturbing to witness decline in performance and states that eroded competitiveness and compromise for the aspiration of the government of up to 20% of growth which could enable Kenya to be prosperous.

Kenya is Africa's second biggest formalized retail economy after South Africa; 30% of Kenyans do their shopping in retail outlets hence boosting the FMCGs. There is hence potential for the FMCGs manufacturers in Kenya, but, in the recent times, some FMCGs manufacturers like

Cadbury Kenya did shut down its plant in Nairobi because of its poor performance (RoK, 2014) while others such as Eveready found it hard to cope in the Kenyan market and have seen their net profit fall by 58.7 per cent (Kandie, 2014). With Fast Moving Consumer Goods having a short lifespan which can lead to increased wastage and loss of goods on transit due to ready market there is a need for effective logistics management such as adoption of logistics management systems which can enhance supply chain performance.

This study sought to fill some of the existing knowledge gaps in studies by Wacuka (2015) who investigated the relationship between inventory management control and supply chain performance of FMCG, Wambui (2015) who focused on the relationship between lean management practices and SC performance of FMCG as well as Onyango (2017) who focused on the relationship between inventory management practices and performance of FMCG in Nairobi County. These studies have focused on FMCG but have not linked logistics management systems to its performance.

2.0 THEORITICAL AND CONCEPTUAL FRAMEWORK

2.1 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.*, 2013). 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, 2010).

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 FMCG, 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.

FMCG 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.,* 2015) leading to evaluation of cognition of the service (Sandstrom, Edvardsson, Kristensson & Magnusson, 2008). It is possible for FMCGs 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 FMCG manufacturers in Kenya. The theory suggests the use of inventory management systems to improve organization's supply chain.

Technology Acceptance Model (TAM)

This theory was proposed by Davis in the year 1989. The main aim of TAM was explaining mechanisms influencing and shaping acceptance of users of new IT. Yan et al, (2009) indicated that TAM was applied mostly in the field of information system and provides theoretical contribution in comprehending acceptance of technology. The aim of TAM is providing explanations on determinants of technology acceptance in general, having the capability of

explaining the behavior of different users justified theoretically (Davis *et al*., 1989). This theory indicates that there are two theories that are key in determining the attitude of users regarding the use of IT and actual use of systems; PEOU and PU to new design features of information system. Usefulness refers to the degree in which someone is convinced that aping the use of systems will improve their performance; and PEOU refers to level in which user are convinced that advantages of using the system overweighs by efforts of using it (Davis, 1993). Adoption of logistics management systems involves changes which are inclusive of re-alignment of existing systems in an organization which will have ultimate effect on ways in which tasks are performed (Kaliannan *et al.*, 2008). Major logistics practices conducted in an organization can be affected greatly because of integration of systems of managing logistics such as JIT, time compression, CPFR, VMI and cross-docking.

This theory therefore explains the PU and PEOU in the adoption of systems for managing logistics by FMCG manufacturers. Therefore, this model is considered appropriate in this research study because it provides comprehension on ICT integration in practices of managing logistics and how it affects SC performance. According to the theory, a new technology is only adopted if it is expected to be more beneficial. Since logistics management systems have been argued to enhance supply chain operations, this theory supports the hypothesis that logistics management systems enhance SC performance. The theory suggests that ICT should be adopted in organization logistic management to enhance supply chain performance.

2.2 Conceptual Framework

Figure 1 shows the conceptual framework. It illustrates the variables of the research and how they relate

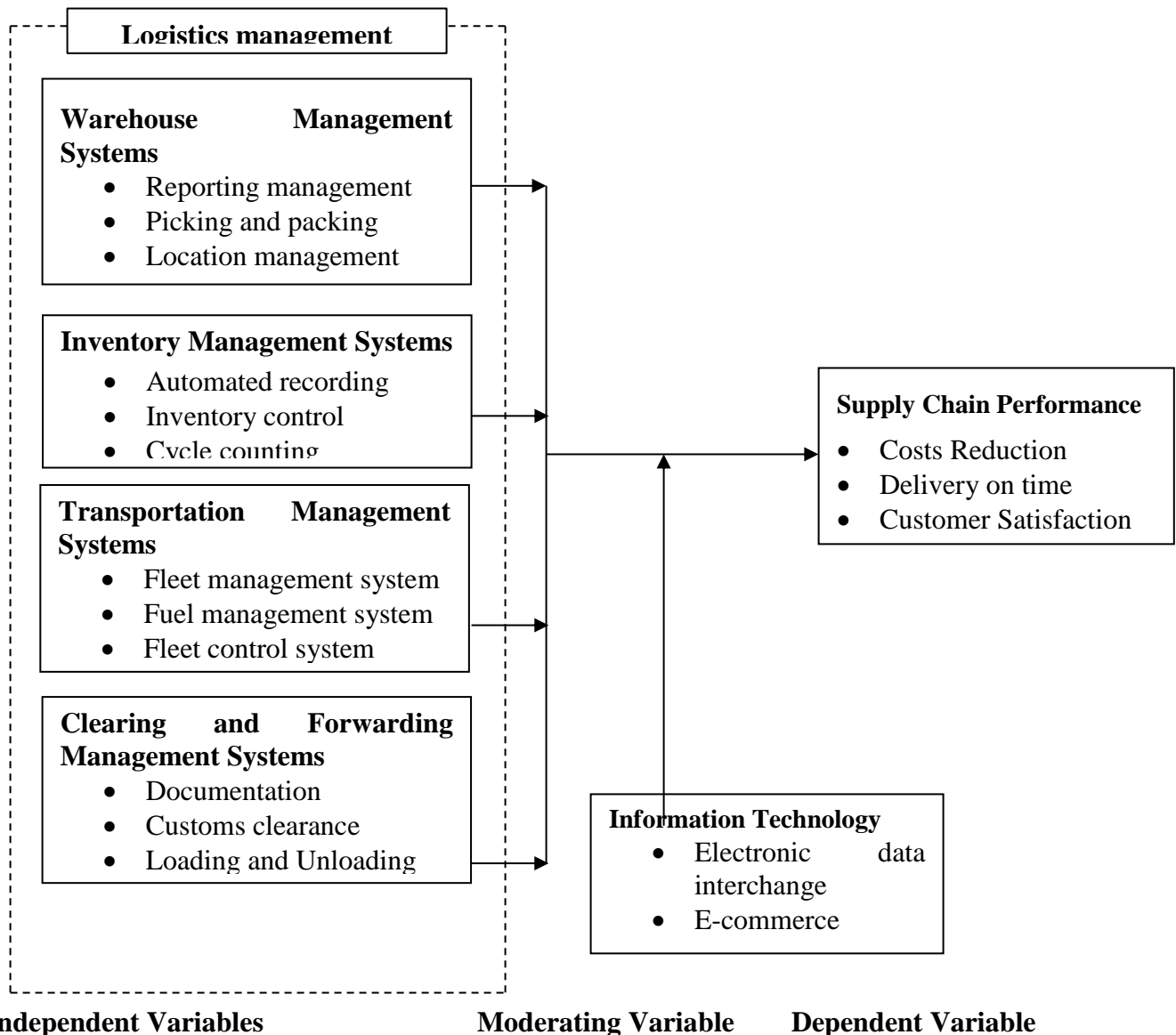**Independent Variables** **Moderating Variable** **Dependent Variable**

Figure 1: Conceptual Framework

3.0 METHODOLOGY

The study used descriptive research design was The study targeted the operations managers of the 51 FMCG manufacturers located in Nairobi. The sample size was 51 respondents who were selected using the census method. Questionnaires were used for data collection. For comprehension, logic and relevance, 5 respondents were used in pre-testing the questionnaire. Descriptive statistics will be used to analyze quantitative data. In order to test the significance of the effect of the predictor variables on response variables, the study used multiple linear regressions. Data collected was analyzed using SPSS version 23 and presentation of the findings done using figures, tables and charts.

4.0 RESULTS

4.1 Descriptive Statistics

4.1.1 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. From the findings presented, the respondents were in agreement that warehouse management system helps to reduce picking errors (M=4.000, SD=0.659); warehouse management system facilities the maximum use of storage space (M=3.915, SD=0.654); warehouse management system helps to optimize stock control (M=3.809, SD=0.825); warehouse management system improves work productivity (M=3.745, SD=0.871); and that warehouse management system guide workers through risk assessments and flag up warehouse safety requirements (M=3.723, SD=0.682). The study findings concurs with Udeh and Karaduman (2015) 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 (2015) 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.

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	4.000	0.659
Warehouse management system facilities the maximum use of storage space	1	1	3	38	4	3.915	0.654
Warehouse management system helps to optimize stock control	2	2	3	36	4	3.809	0.825
Warehouse management system improves work productivity	3	1	4	36	3	3.745	0.871
Warehouse management system guide workers through risk assessments and flag up warehouse safety requirements	1	2	7	36	0	3.723	0.682

4.1.2 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. From the findings presented in Table 2, the respondents agreed that inventory management systems promotes improved supplier, vendor, and partner relationships (M=3.979, SD=0.707); inventory management systems enables the company to maintain a centralized record of every asset (M=3.957, SD=0.624); inventory management systems helps in reduction in storage costs (M=3.957, SD=0.721); inventory management systems helps to keep track on current stock levels which enables the company to reorder with greater accuracy (M=3.894, SD=0.667); and that inventory management systems promotes better reporting and forecasting capabilities (M=3.830, SD=0.816). The study findings agrees with the findings of Atnafu and Balda (2018) 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.

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	3.979	0.707
Inventory management systems enables the company to maintain a centralized record of every asset	1	1	3	35	7	3.957	0.624
Inventory management systems helps in reduction in storage costs	1	2	1	37	5	3.957	0.721
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	3.894	0.667
Inventory management systems promotes better reporting and forecasting capabilities	2	1	5	34	5	3.830	0.816

4.1.3 Transportation Management Systems

Respondents indicated the level to which they agree or disagree with the following statements on the effects of transportation management systems on performance of supply chain (SC). The results obtained were as presented in Table 3.From the findings in table 3, the respondents

agreed that transport management systems provides trade compliance information and documentation (M=3.979, SD=0.675); transport management systems make it easier for businesses to manage and optimize their transportation operations, whether they are by land, air, or sea (M=3.957, SD=0.624); transport management systems ensures timely delivery of freight and goods (M=3.915, SD=0.880); transport management systems provides visibility into day-to-day transportation operations (M=3.915, SD=0.583); and transportation management systems helps to streamline shipping process (M=3.872, SD=0.647). The study finding concurs with the findings of Michaelides (2010) that efficiency is also improved by having daily automated vehicle checks. Automation of scheduling process is advantageous because it leads to fewer interventions by the management and therefore lowering any chances of delays. It also agrees with Cheema (2011) that the use of RFID results in improved effectiveness and efficiency in manufacturing, and therefore improving SC in the organization.

Respondents also explained the challenges faced in the use of technology to manage transportation activities. There has been improvement in business process with advancement in technology. This is a challenge facing logistics companies because they have to be at par with these changes and advancements. The companies should take advantage of these advancement, which sounds very exciting but adopting them and implementing them can be challenging. Companies are faced with several technologies they need to implement; this might mean outsourcing of resources and experts. Despite the fact that these technological improvements are beneficial to the company, the company faces the challenge of how they will pay and who will help in implementing or making the required improvements. Another challenge is lack of effective coordination; this is mainly because several parties like manufactures, drivers and managers are involved and it's not possible to have a centralized control system and therefore fragmentation comes in place which causes inefficiency.

Table 3: Transportation Management Systems on Performance of Supply Chain

Statement	1	2	3	4	5	Mean (M)	Std. Dev.(SD)
Transport management systems provides trade compliance information and documentation	1	1	1	40	4	3.979	0.675
Transport management systems make it easier for businesses to manage and optimize their transportation operations, whether they are by land, air, or sea.	1	1	2	37	6	3.957	0.624
Transport management systems ensures timely delivery of freight and goods	1	1	1	42	3	3.915	0.880
Transport management systems provides visibility into day-to-day transportation operations	1	2	1	41	2	3.915	0.583
Transportation management systems helps to streamline shipping process	2	2	2	39	3	3.872	0.647

4.1.4 Clearing and Forwarding Management Systems

Respondents indicated the level to which they agree or disagree with statements on the effects of clearing and forwarding Management Systems on performance of SC in FMCG manufacturers in Kenya. Table 4 presents the findings obtained. From the findings presented in Table 4, the respondents agreed that clearing and forwarding management systems ensures reduction in average lodgment cost (M=3.936, SD=0.485); clearing and forwarding management systems ensures reduction in average lodgment time (M=3.936, SD=0.818); clearing and forwarding

management systems ensures reduction in average clearance time (M=3.915, SD=0.620); clearing and forwarding management systems ensures efficient transportation of goods (M=3.851, SD=0.884); and that clearing and forwarding management systems ensures reduction in average clearance time (M=3.809, SD=0.741). The study findings concurred with the findings of Boateng-Manu (2015) that loyalty of customers is significantly influenced by quality of service, client satisfaction, trust, and price satisfaction. Also he found that loyalty of customers was negatively and significantly influenced by price while client/customer satisfaction had positive and significant effect on their level of loyalty. Therefore, from the findings it can be said that when customers feel satisfied with the service then they will be loyal to the industry of freight forwarding which agrees with the findings of our study.

Respondents explained the challenges faced by use of clearing and forwarding in logistics management systems. There is the challenge of cost forwarding; the most common currency used is US dollar which changes at any particular time and therefore affecting the freight cost. This also affects the price of customer goods and the charges by the bank. Another challenge is with service charges and fees. The expense that has to be paid at point of embarking and destination vary from country to country and therefore if the ship is unable to pay the service charge or docking fee, it is forced to remain at sea and since there are no standards it becomes even more challenging. There is the challenge of container capacity. The container should be full when shipping therefore if it is not full, the cost of goods being transported will increase because they will incur the cost of the empty part of the container. There are other economic challenges such as government regulations and environmental challenges.

There is the challenge of long bureaucracy procedures by officials at the port, some of the officials lack knowledge and clearing and forwarding and this takes a long time before the government releases shipments. There is challenge with the submission of documents which affects clearing time. For clearing to be effective, it depends on clear regulations by customer department and ensure that the employees in this department are well knowledgeable of their task and are well organized and motivated to conduct their duties.

Table 4: Clearing and Forwarding Management Systems on Performance of SC

Statement	1	2	3	4	5	Mean (M)	Std. Dev.(SD)
Clearing and forwarding management systems ensures reduction in average lodgment cost	2	1	2	35	8	3.936	0.485
Clearing and forwarding management systems ensures reduction in average lodgment time	1	1	2	40	4	3.936	0.818
Clearing and forwarding management systems ensures reduction in average clearance time	1	0	1	44	1	3.915	0.620
Clearing and forwarding management systems ensures efficient transportation of goods	2	1	3	39	2	3.851	0.884
Clearing and forwarding management systems ensures reduction in average clearance time	2	2	4	32	6	3.809	0.741

4.1.5 Information Technology

Respondents indicated the level to which they agreed or disagreed with statements on the effects of Information Technology on logistics management systems on performance of SC in FMCG manufacturers in Kenya. Table 5 presents the findings obtained. The findings in table 5 show

that the respondents agreed that information technology helps in ensuring that ensure that there is no waste in the supply chain (M=3.936, SD=0.485); information technology enables the organization to acquire stock at the right time (M=3.936, SD=0.818); information technology has helped their organization to integrate all its business to enhance efficiency (M=3.915, SD=0.620); information technology ensures that customer products are delivered on time (M=3.851, SD=0.884); and that information technology enhances communication between the organization and suppliers (M=3.809, SD=0.741). The study findings concurs with Ralston (2013) who found that the transaction time between manufacturers exchange and the supplier is sped by consolidation of orders and purchasing orders with the use of ERP systems. It also agrees with the findings of Akibate (2015) that strategies of e-procurement enhanced the performance of procurement through the reduction of transaction cost and cycle times; which allows the possibility to develop inventory managed by vendors and improving delivery time; facilitate accurate deliveries because of lowered errors in order by suppliers; Shared data on measures of performance encouraging better performance by suppliers; lowered stock as a result of shared sales/predicted information; possibility to use self-billing.

Respondents also explained the challenges faced in the use of technology to logistics management systems. The most common challenge with the use of technology is system instability. When there is recurrent service failure, there is instability especially if the service played a crucial role in the application. Lack of proper updates of the software which end up causing downtime; this is because of introducing new updates without first testing them. There is the challenge of poor quality database systems which occurs when the company purchases systems without evaluating for their compatibility with business needs and expected growth in the future. Another challenge arises from lack of technology management; failure to manage technology exposes the business to failure in technology.

Table 5: Information Technology on Logistics Management Systems on Performance of SC

Statement	1	2	3	4	5	Mean (M)	Std. Dev.(SD)
Information technology helps in ensuring that ensure that there is no waste in the supply chain	2	1	2	32	9	3.936	0.485
Information technology enables the organization to acquire stock at the right time	2	2	3	35	6	3.936	0.818
Information technology has helped my organization to integrate all its business to enhance efficiency	2	2	3	35	6	3.915	0.620
Information technology ensures that customer products are delivered on time	2	2	4	36	4	3.851	0.884
Information technology enhances communication between the organization and suppliers	3	2	5	33	5	3.809	0.741

4.5.6 Supply Chain Performance

Respondents indicated the level to which they agree or disagree with statements on supply chain performance in FMCG manufacturers in Kenya. Table 6 presents the findings obtained. The findings in table 6 show that the respondents agreed that the logistic management systems has improved customer satisfaction since products are delivered on time (M=3.936, SD=0.791); the logistic management systems helps in reducing operating costs (M=3.915, SD=0.880); the logistic management systems ensures that products are delivered on time (M=3.872,

SD=0.824);and that the logistic management systems has led to reduced supply chain costs (M=3.830, SD=0.816). The study finding concurs with Sillanpää (2015) 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.

Table 6: Supply Chain Performance in FMCG 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	3.936	0.791
The logistic management systems helps in reducing operating costs	2	2	2	33	8	3.915	0.880
The logistic management systems ensures that products are delivered on time	2	2	1	37	5	3.872	0.824
The logistic management systems has led to reduced supply chain costs	2	1	5	34	5	3.830	0.816

4.1.7 Trend in Supply Chain Performance

Respondents were also asked to provide information on supply chain performance. Table 7 presents the findings obtained.

Table 7: Indicators of Supply Chain Performance

Statement	2014	2015	2016	2017	2018
Total Production (Kshs.)	2.03	2.58	2.73	3.25	3.69
Total operation (Kshs.)	1.01	0.92	0.78	0.69	0.57
Average delivery (Kshs.)	1.27	1.36	1.3	1.48	1.52
Average lead time	36hrs	30 hrs	24 hrs	12 hrs	6 hrs
Cost reduction	10%	12%	19%	23%	36%
Productivity	7%	13%	20%	39%	56%

From the findings presented in table 7, there has been a growth trend in production in Fast Moving Consumer Goods Manufacturers in Nairobi from the year 2014 to 2018. The growth has been attributed to the adoption of logistics management systems; adoption of technology has made it possible for the companies to grow their production.

The results on operation show that, there has been a decrease in the operation cost in Fast Moving Consumer Goods Manufacturers in Nairobi from the year 2014 to 2018. The decrease in operation cost has been attributed to adoption of more efficient techniques of production by adopting technology. Technology adoption has also reduced the labor force in companies which significantly reduces costs incurred in production processes. About average delivery, results shows the trend in average delivery in Fast Moving Consumer Goods Manufacturers in Nairobi from the year 2014 to 2018. Between 2014 and 2015 there was growth but in 2016 there was a significant decline in delivery but later it significantly grew in 2017 and 2018. Growth in delivery has been attributed to the adoption of good technology through the adoption of logistics management systems.

Between 2014 and 2018, the table 8, shows that there was a significant decline in the lead time in Fast Moving Consumer Goods Manufacturers in Nairobi. Technology adopted through adoption of advances logistics management systems has resulted to a significant reduction of time in production. Therefore technology reduces lead time in companies. The results on lead time, shows that between 2014 and 2018, Fast Moving Consumer Goods Manufacturers in Nairobi recorded a significant increase in cost reduction. Over the year, the companies have adopted advanced logistics management system which has led to significant reduction in reduction.

Table 7, shows a trend in growth of productivity in Fast Moving Consumer Goods Manufacturers in Nairobi. Through their adoption of logistics management systems, the companies have recorded a significant increase in their productivity.

4.2 Regression Analysis

4.2.1 Multicollinearity

Variance Inflation Factor (VIF) was used to measure multicollinearity. According to Bryman and Cramer (2012) if the VIF value is greater than 4, further investigation is warranted, if there is more than one variable having a VIF value exceeding five, one of them has to be dropped. From the findings presented in Table 8, the VIF values for all the variables was less than 5, a clear indication that multicollinearity doesn't exist between the study variables. The variables were found to lack high correlations among themselves; therefore, multiple regression analysis can be conducted.

Table 8: Multicollinearity Test Statistics

	Collinearity Statistics	
	Tolerance	VIF
Warehouse Management Systems	.898	1.114
Inventory Management Systems	.803	1.246
Transportation Management Systems	.869	1.151
Clearing and Forwarding Management Systems	.784	1.276
Information Technology	.786	1.272

4.2.2 Autocorrelation Test

Autocorrelation was checked in linear regression model using Durbin-Watson test. The null hypothesis for the Durbin-Watson's d tests is that the residuals are not linearly autocorrelated. The d value ranges from 0 and 4, if the d values are; $1.5 < d < 2.5$ it implies absence of autocorrelation in the data. Findings presented in Table 9 show that the d-value was 2.003; since the value lies within the range $1.5 < d < 2.5$, then we conclude that there is no autocorrelation in the data and therefore regression analysis can be computed.

Table 9: Durbin-Watson Autocorrelation Test

Model	Std. Error of the Estimate	Durbin-Watson
1	4.44830	2.003

4.2.3 Heteroscedasticity

Vinod (2008), states that Heteroscedasticity refers to an instance where variable variability is unequal over ranges of values for the variable predicting. Breuch-pagan / cook-weisberg test was used to test for Heteroscedasticity. The null hypothesis for this test is that the variances of error

terms are equal (Vinod, 2008). If "Prob > Chi-squared" is greater than 0.05 it suggests existence of homoscedasticity (Park, 2008). The findings presented in table 10 shows Chi2 = 2.3457 has p-value P (0.7641) greater than 0.05. This therefore suggests insignificance and therefore there is no heteroscedasticity.

Table 10: Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Ho: Constant variance			
Statistics	Df	Stat value	p-value
Chi-squared	5	2.3457	0.7641

4.2.4 Normality Assumption

Before computing regression analysis, normality assumption must be met; failure to do so results in distorted tests for significance and relationships. Shapiro Wilk Test was used to test for normality assumption. The null hypothesis is that the data is normally distributed. We reject the null hypothesis if the p-value is less than the selected level of significance (0.05), suggesting that the data used is not from a normal population, does not follow a normal distribution. If the p-value obtained is greater than the selected level of significance (0.05), we fail to reject the null hypothesis and conclude that the data is from a normal population, is normally distributed. From the findings in Table 11, the results of the analysis shows that warehouse management systems had p-value=0.292>0.05; inventory management systems had p-value=0.083>0.05; transportation management systems had p-value=0.079>0.05; clearing and forwarding management systems had p-value=0.243>0.05; information technology had p-value=0.189>0.05; and supply chain performance had p-value=0.174>0.05. This shows that all the variables were normally distributed and hence the data meets the regression analysis assumption of normality of data.

Table 11: Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
Warehouse Management Systems	.945	47	0.292
Inventory Management Systems	.980	47	0.083
Transportation Management Systems	.942	47	0.079
Clearing and Forwarding Management Systems	.860	47	0.243
Information Technology	.969	47	0.189
Supply Chain Performance	.953	47	0.174

4.3 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, transportation management systems, clearing and forwarding management systems and supply chain performance of fast-moving consumer goods manufacturers in Kenya. The findings presented in Table 12 warehouse management system is seen to have a significant relationship with supply chain performance; the relationship between the two variables was strong (r=0.611, p=0.004). Inventory management system is also seen to have a strong positive and significant relationship with supply chain performance (r=0.698, p=0.006). From the findings, transportation management system had a positive and significant relationship with supply chain performance, the relationship between the two variables was strong (r=0.733,

p=0.004). Finally, clearing and forwarding management system is seen to have a strong positive and significant relationship with performance of supply chain (r=0.763, p=0.022). These findings show that logistics management systems (warehouse management systems, inventory management systems, transportation management systems, clearing and forwarding management systems) have significant relationship with supply chain performance in fast moving consumer goods companies in Nairobi.

Table 12: Correlations

		Supply Chain Performance	Warehouse Management	Inventory Management	Transportation Management	Clearing and Forwarding
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		
Transportation Management Systems	Pearson Correlation	.733	.015	.264	1	
	Sig. (2-tailed)	.004[*]	.922	.073		
	N	47	47	47	47	
Clearing and Forwarding Management Systems	Pearson Correlation	.763	.093	.479	.138	1
	Sig. (2-tailed)	.022[*]	.535	.051	.355	
	N	47	47	47	47	47

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

4.4 Regression Analysis

4.4.1 Regression Analysis for Warehouse Management Systems

The sought to establish the effect of warehouse management systems on supply chain performance of fast-moving consumer goods manufacturers in Kenya. The regression model for Objective 1 was Y= βo + $\beta_1 X_1$ + ε.

From the fining presented in table 13, the value of adjusted R^2 was 0.770 which implies that 77% of variations in supply chain performance can be attributed to changes in warehouse management systems. The remaining 23% 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 0.880. From the Anova findings, the p-value obtained was 0.000 which is less than 0.05, an indication that the model was significant. The findings also show that the f-calculated value was 155.198 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 in fast moving consumer goods companies in Nairobi.

From the coefficients table, the following model was fitted;

Y= 1.111 + 0.762 X$_1$ + ε

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 1.111. The findings also show that a unit increase in warehouse management system will lead to a 0.762 increase in supply chain performance in FMCG in Nairobi. The findings also show that the t-statistic (12.458) has a p-value (0.000) which is less than the selected level of significance (0.05). Therefore we accept the first null hypothesis (**H$_{A1}$**) and conclude that warehouse management systems positively influences supply chain performance of Fast Moving Consumer Goods manufacturers in Kenya.

Table 13: Regression Analysis for Warehouse Management Systems

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.880[a]	.775	.770	.08440
a. Predictors: (Constant), Warehouse Management Systems				

ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.105	1	1.105	155.198	.000[b]
1 Residual	.321	45	.007		
Total	1.426	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)	1.111	.212		5.241	.004
Warehouse Management Systems	.762	.061	.880	12.458	.000
a. Dependent Variable: Supply Chain Performance					

4.4.2 Regression Analysis for Inventory Management Systems

The study sought to determine the influence of inventory management systems on supply chain performance of fast-moving consumer goods manufacturers in Kenya. The regression model for this equation was Y= β$_0$ + β$_2$X$_2$ + ε.

From the finding presented in table 14, the value of adjusted R^2 was 0.616 which implies that 61.6% of variations in supply chain performance can be attributed to changes in inventory management systems. The remaining 38.4% 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 0.790.

From the Anova findings, the p-value obtained was 0.000 which is less than 0.05, an indication that the model was significant. The findings also show that the f-calculated value was 74.713 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 in fast moving consumer goods companies in Nairobi.

From the coefficients table, the following model was fitted;

$$Y= 1.978 + 0.371 X_2 + \varepsilon$$

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 1.978. The findings also show that a unit increase in inventory management system will lead to a 0.371 increase in supply chain performance in FMCG in Nairobi. The findings also show that the t-statistic (8.644) has a p-value (0.000) which is less than the selected level of significance (0.05). Therefore we accept the second null hypothesis (H_{A2}) and conclude that inventory management systems positively influences supply chain performance of Fast Moving Consumer Goods manufacturers in Kenya.

Table 14: Regression Analysis for Inventory Management Systems

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.790[a]	.624	.616	.10914

a. Predictors: (Constant), Inventory Management Systems

ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.890	1	.890	74.713	.000[b]
Residual	.536	45	.012		
Total	1.426	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)	1.978	.091		21.748	.000
Inventory Management Systems	.371	.043	.790	8.644	.000

a. Dependent Variable: Supply Chain Performance

4.4.3 Regression Analysis for Transportation Management Systems

The third objective of the study was to investigate the effect of transportation management systems on supply chain performance of FMCG in Kenya. The regression model for this objective was $Y= \beta o + \beta_3 X_3 + \varepsilon$.

From the fining presented in table 4.17, the value of adjusted R^2 was 0.768 which implies that 76.8% of variations in supply chain performance can be attributed to changes in transportation management systems. The remaining 23.2% variations in supply chain performance can be attributed to other aspects other than changes in transportation management system. The findings also show that transportation management system and supply chain performance are strongly and positively relates as indicated by a correlation coefficient (R) value of 0.879.

From the Anova findings, the p-value obtained was 0.000 which is less than 0.05, an indication that the model was significant. The findings also show that the f-calculated value was 153.487 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 transportation management system is reliable and can be used to predict supply chain performance in fast moving consumer goods companies in Nairobi.

From the coefficients table, the following model was fitted;

$$Y= 1.347 + 0.857 X_3 + \varepsilon$$

From the equation above, when transportation management system is held to a constant zero, performance of supply chain will be at a constant value of 1.347. The findings also show that a unit increase in transportation management system will lead to a 0.857 increase in supply chain performance in FMCG in Nairobi. The findings also show that the t-statistic (12.389) has a p-value (0.000) which is less than the selected level of significance (0.05). Therefore we accept the second null hypothesis (H_{A3}) and conclude that transportation management systems positively influences supply chain performance of Fast Moving Consumer Goods manufacturers in Kenya.

Table 15: Regression Analysis for Transportation Management Systems

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.879[a]	.773	.768	.08476

a. Predictors: (Constant), Transportation Management Systems

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	1.103	1	1.103	153.487	.000[b]
1	Residual	.323	45	.007		
	Total	1.426	46			

a. Dependent Variable: Supply Chain Performance

b. Predictors: (Constant), Transportation Management Systems

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.347	.250		5.388	.002
Transportation Management Systems	.857	.069	.879	12.389	.000

a. Dependent Variable: Supply Chain Performance

4.4.4 Regression Analysis for Clearing and Forwarding Management Systems

The fourth objective of this study was to investigate the influence of clearing and forwarding management systems on supply chain performance of FMCG manufacturers in Kenya. The regression model for this variable was $Y = \beta o + \beta_4 X_4 + \varepsilon$. From the fining presented in table 16, the value of adjusted R^2 was 0.773 which implies that 77.3% of variations in supply chain performance can be attributed to changes in clearing and forwarding management systems. The remaining 22.7% variations in supply chain performance can be attributed to other factors other than clearing and forwarding management system. The findings also show that clearing and forwarding management system and supply chain performance are strongly and positively relates as indicated by a correlation coefficient (R) value of 0.882.

From the Anova findings, the p-value obtained was 0.000 which is less than 0.05, an indication that the model was significant. The findings also show that the f-calculated value was 157.947 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 clearing and forwarding management system is reliable and can be used to predict supply chain performance in fast moving consumer goods companies in Nairobi.

From the coefficients table, the following model was fitted;

Y= 1.756 + 0.341 X$_4$+ ε

From the equation above, when clearing and forwarding management system is held to a constant zero, performance of supply chain will be at a constant value of 1.756. The findings also

show that a unit increase in clearing and forwarding management system will lead to a 0.341 increase in supply chain performance in FMCG in Nairobi. The findings also show that the t-statistic (12.568) has a p-value (0.000) which is less than the selected level of significance (0.05). Therefore we accept the second null hypothesis ($\mathbf{H_{A4}}$) and conclude that clearing and forwarding management systems positively influences supply chain performance of Fast Moving Consumer Goods manufacturers in Kenya.

Table 16: Regression Analysis for Clearing and Forwarding Management Systems

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.882[a]	.778	.773	.08382

a. Predictors: (Constant), Clearing and Forwarding Management Systems

ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.110	1	1.110	157.947	.000[b]
1 Residual	.316	45	.007		
Total	1.426	46			

a. Dependent Variable: Supply Chain Performance

b. Predictors: (Constant), Clearing and Forwarding Management Systems

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.756	.080		21.886	.000
1 Clearing and Forwarding Management Systems	.341	.027	.882	12.568	.000

a. Dependent Variable: Supply Chain Performance

4.4.5 Overall Regression Model before Moderating

The regression model before moderating influence of Information Technology was;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

From the findings in the above Table 17 on model summary, the value of adjusted R square was 0.929 which suggests that 92.9% variation in supply chain performance can be explained by changes in clearing and forwarding management systems, warehouse management systems, transportation management systems, and inventory management systems. The remaining 7.1% suggests that there are other factors that can be attributed to variation in supply chain performance of fast-moving consumer goods manufacturers in Nairobi that were not discussed in this study. Correlation coefficient (R) shows the relationship strength between the study variables. From the findings the variables were strongly and positively related as indicated r= 0.967.

From the Anova table, the model was significant since the p-value (0.000) was less than 0.05 thus the model is statistically significance in establishing the effects of clearing and forwarding management systems, warehouse management systems, transportation management systems, and inventory management systems on supply chain performance of FMCG manufacturers in Kenya. Further, the F-calculated (151.665) was greater than the F-critical ($F_{4,42}=2.594$) suggesting that

logistics management systems can be used to predict supply chain performance of fast-moving consumer goods manufacturers in Kenya.

From the coefficients table, the following regression model was fitted:

$$Y = 0.689 + 0.532\ X_1 + 0.180\ X_2 + 0.239\ X_3 + 0.198\ X_4 + \varepsilon$$

The model equation above reveals that holding the variables clearing and forwarding management systems, warehouse management systems, transportation management systems, and inventory management systems to a constant zero, supply chain performance of FMCG in Kenya Agribusiness will be at a constant value of 0.689.

The findings also show that warehouse management systems has a positive influence on Supply chain performance ($\beta = 0.532$). The influence was significant since the p-value obtained ($P = 0.001$) was less than the selected level of significance (0.05). Therefore, improvements in warehouse management systems will results to an increase in Supply chain performance of FMCG in Kenya by 0.532 units.

Inventory management systems is also seen to have significant relationship with Supply chain performance ($\beta = 0.180$, $p=0.026$). 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 fast-moving consumer goods manufacturers in Kenya

Further, transportation management systems is seen to have a positive influence on Supply chain performance ($\beta = 0.239$). The influence was significant since the p-value obtained ($P = 0.036$) was less than the selected level of significance (0.05). Therefore, improvements in transportation management systems will results to improvement in supply chain performance of fast-moving consumer goods manufacturers in Kenya.

Finally, clearing and forwarding management systems is also seen to have significant relationship with Supply chain performance ($\beta = 0.198$, $p=0.000$). The influence of clearing and forwarding management systems on supply chain performance is seen to be positive. Therefore improvement in clearing and forwarding management systems will result to an increase in supply chain performance of fast-moving consumer goods manufacturers in Kenya.

Table 17: Overall Regression Model before Moderating

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.967[a]	.935	.929	.04689

a. Predictors: (Constant), Clearing and Forwarding Management Systems, Inventory Management Systems, Warehouse Management Systems, Transportation Management Systems

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	1.334	4	.333	151.665	.000[b]
1	Residual	.092	42	.002		
	Total	1.426	46			

a. Dependent Variable: Supply Chain Performance

b. Predictors: (Constant), Clearing and Forwarding Management Systems, Inventory Management Systems, Warehouse Management Systems, Transportation Management Systems

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.687	.241		2.854	.007
Warehouse Management Systems	.532	.084	.153	6.333	.001
Inventory Management Systems	.180	.039	.170	2.769	.026
1 Transportation Management Systems	.239	.110	.245	2.167	.036
Clearing and Forwarding Management Systems	.198	.022	.511	8.829	.000

a. Dependent Variable: Supply Chain Performance

4.4.6 Moderated Regression Analysis

The fifth objective of the study was to assess how information technology moderates the influence of logistics management systems on supply chain performance of fast-moving consumer goods manufacturers in Kenya. To achieve this objective, the following moderated multiple regression models was adopted:

$$Y= \beta o + \beta_1 X_1*M + \beta_2 X_2*M + \beta_3 X_3*M + \beta_4 X_4*M + \varepsilon$$

From the model summary findings in Table 4.20, the value of adjusted R square was 0.702 which suggests that 70.2% variation in supply chain performance can be explained by changes in moderated clearing and forwarding management systems, warehouse management systems, transportation management systems, and inventory management systems. The remaining 28.2% suggests that there are other factors that can be attributed to variation in supply chain performance of fast-moving consumer goods manufacturers in Nairobi that were not discussed in this study. Correlation coefficient (R) shows the relationship strength between the study variables. From the findings the variables were strongly and positively related as indicated r= 0.853.

From the Anova table, the model was significant since the p-value (0.000) was less than 0.05 thus the model is statistically significance in establishing the effects of moderated clearing and forwarding management systems, warehouse management systems, transportation management systems, and inventory management systems on supply chain performance of FMCG manufacturers in Kenya. Further, the F-calculated (28.113) was greater than the F-critical

($F_{4,42}$=2.594) suggesting that logistics management systems moderated by information technology can be used to predict supply chain performance of fast-moving consumer goods manufacturers in Kenya.

From the coefficients table, the following regression model was fitted:

$$Y = 1.892 + 0.394\ X_1*M + 0.326\ X_2*M + 0.455\ X_3*M + 0.315\ X_4*M + ε$$

The model equation above reveals that holding the moderated variables (clearing and forwarding management systems* information technology, inventory management systems* information technology, warehouse management systems* information technology, transportation management systems* information technology) to a constant zero, supply chain performance of FMCG in Kenya Agribusiness will be at a constant value of 1.892.

The findings also show that Warehouse management systems* Information Technology has a positive influence on Supply chain performance ($β$ = 0.394). The influence was significant since the p-value obtained (P = 0.012) was less than the selected level of significance (0.05). Therefore, improvements in Warehouse management systems* Information Technology will results to an increase in Supply chain performance of FMCG in Kenya by 0.394 units. The findings also show that the t-statistic (3.788) has a significance level of 0.012<0.05 an indication that the moderating variable is significant.

Inventory management systems* Information Technology is also seen to have significant relationship with Supply chain performance ($β$ = 0.326, p=0.036). The influence of Inventory management systems* Information Technology on supply chain performance is seen to be positive. Therefore improvement in Inventory management systems* Information Technology will result to an increase in supply chain performance of fast-moving consumer goods manufacturers in Kenya. The t-statistic (3.135) is significant an indication that the moderated variable is significant (p=0.036<0.05).

Further, Transportation management systems* Information Technology is seen to have a positive influence on Supply chain performance ($β$ = 0.455). The influence was significant since the p-value obtained (P = 0.001) was less than the selected level of significance (0.05). Therefore, improvements in Transportation management systems* Information Technology will results to improvement in supply chain performance of fast-moving consumer goods manufacturers in Kenya. The t-statistic for the moderated variable (4.417) is significant (p=0.001<0.05) an indication that the moderating variable was significant.

Finally, Clearing and forwarding management systems* Information Technology is also seen to have significant relationship with Supply chain performance ($β$ = 0.315, p=0.037). The influence of Clearing and forwarding management systems* Information Technology on supply chain performance is seen to be positive. Therefore improvement in Clearing and forwarding management systems* Information Technology s will result to an increase in supply chain performance of fast-moving consumer goods manufacturers in Kenya. Also, the t-statistic (3.088) for the moderated variable is significant (p=0.037<0.05) an indication that the moderating variable is significant.

From the findings above, the t-statistic for all the four moderated variables (clearing and forwarding management systems* information technology, inventory management systems*

information technology, warehouse management systems* information technology, and transportation management systems* information technology) are significant since their p-values are less than the selected level of significance (0.05). We therefore accept the null hypothesis H_{A5} and conclude that information technology positively influences logistics management systems on SC performance of FMCG manufacturers in Kenya.

Table 17: Moderated Regression Analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.853[a]	.728	.702	.08502

a. Predictors: (Constant), Clearing and forwarding management systems* Information Technology, Inventory management systems* Information Technology, Warehouse management systems* Information Technology, Transportation management systems* Information Technology

ANOVA[a]					
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.813	4	.203	28.113	.000[b]
1	Residual	.304	42	.007		
	Total	1.116	46			

a. Dependent Variable: Supply chain performance

b. Predictors: (Constant), Clearing and forwarding management systems* Information Technology, Inventory management systems* Information Technology, Warehouse management systems* Information Technology, Transportation management systems* Information Technology

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.892	0.408		4.637	0.000
Warehouse management systems* Information Technology	0.394	0.104	0.333	3.788	0.012
Inventory management systems* Information Technology	0.326	0.104	0.272	3.135	0.036
Transportation management systems* Information Technology	0.455	0.103	0.778	4.417	0.001
Clearing and forwarding management systems* Information Technology	0.315	0.102	0.309	3.088	0.037

a. Dependent Variable: Supply chain performance

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The study found that the respondents were in agreement that warehouse management system helps to reduce picking errors; warehouse management system facilities the maximum use of storage space; warehouse management system helps to optimize stock control; warehouse management system improves work productivity; and that warehouse management system guide workers through risk assessments and flag up warehouse safety requirements.

They indicated that most of the challenges that warehouse faced included high cost of labor, process redundancy and inaccurate inventories is solved by having a robust system. 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.

The study found that respondents agreed that inventory management systems promotes improved supplier, vendor, and partner relationships; inventory management systems enables the company to maintain a centralized record of every asset; inventory management systems helps in reduction in storage costs; inventory management systems helps to keep track on current stock levels which enables the company to reorder with greater accuracy; and that inventory management systems promotes better reporting and forecasting capabilities. The study also identified 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. 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 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.

The study established that transport management systems provides trade compliance information and documentation; transport management systems make it easier for businesses to manage and optimize their transportation operations, whether they are by land, air, or sea; transport management systems ensures timely delivery of freight and goods; transport management systems provides visibility into day-to-day transportation operations; and transportation management systems helps to streamline shipping process. Te study also identified some of the challenges faced in the use of technology to manage transportation activities. There has been improvement in business process with advancement in technology. This is a challenge facing logistics companies because they have to be at par with these changes and advancements. The companies should take advantage of these advancement, which sounds very exciting but adopting them and implementing them can be challenging. Companies are faced with several technologies they need to implement; this might mean outsourcing of resources and experts. Despite the fact that these technological improvements are beneficial to the company, the company faces the challenge of how they will pay and who will help in implementing or making the required improvements. Another challenge is lack of effective coordination; this is mainly because several parties like manufactures, drivers and managers are involved and it's not possible to have a centralized control system and therefore fragmentation comes in place which causes inefficiency.

The study found that respondents agreed that clearing and forwarding management systems ensures reduction in average lodgment cost; clearing and forwarding management systems

ensures reduction in average lodgment time; clearing and forwarding management systems ensures reduction in average clearance time; clearing and forwarding management systems ensures efficient transportation of goods; and that clearing and forwarding management systems ensures reduction in average clearance time. The study also established that there are challenges faced by use of clearing and forwarding in logistics management systems. There is the challenge of cost forwarding; the most common currency used is US dollar which changes at any particular time and therefore affecting the freight cost. This also affects the price of customer goods and the charges by the bank. Another challenge is with service charges and fees. The expense that has to be paid at point of embarking and destination vary from country to country and therefore if the ship is unable to pay the service charge or docking fee, it is forced to remain at sea and since there are no standards it becomes even more challenging. There is the challenge of container capacity. The container should be full when shipping therefore if it is not full, the cost of goods being transported will increase because they will incur the cost of the empty part of the container. There are other economic challenges such as government regulations and environmental challenges.

There is also the challenge of long bureaucracy procedures by officials at the port, some of the officials lack knowledge n clearing and forwarding and this takes a long time before the government releases shipments. There is challenge with the submission of documents which affects clearing time. For clearing to be effective, it depends on clear regulations by customer department and ensure that the employees in this department are well knowledgeable of their task and are well organized and motivated to conduct their duties.

The study established that respondents agreed that information technology helps in ensuring that ensure that there is no waste in the supply chain; information technology enables the organization to acquire stock at the right time; information technology has helped their organization to integrate all its business to enhance efficiency; information technology ensures that customer products are delivered on time; and that information technology enhances communication between the organization and suppliers. The study also identified some challenges faced in the use of technology to logistics management systems. The most common challenge with the use of technology is system instability. When there is recurrent service failure, there is instability especially if the service played a crucial role in the application. Lack of proper updates of the software which end up causing downtime; this is because of introducing new updates without first testing them. There is the challenge of poor quality database systems which occurs when the company purchases systems without evaluating for their compatibility with business needs and expected growth in the future. Another challenge arises from lack of technology management; failure to manage technology exposes the business to failure in technology.

5.2 Conclusion

The study concluded that warehouse management systems positively and significantly influences Supply chain performance of FMCG in Kenya. The study also concluded that inventory management systems positively and significantly influences Supply chain performance of FMCG in Kenya. The study led to conclusions that transportation management systems positively and significantly influence Supply chain performance of FMCG in Kenya. The study also concluded that clearing and forwarding management systems have positive significant relationship with

Supply chain performance of FMCG in Kenya. The study led to conclusions that information technology has a positive significant influence on the relationship between logistics management systems and supply chain performance of FMCG manufacturers in Kenya.

5.3 Recommendations

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.

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.

Transportation management systems enhance performance of supply chain in FMCG manufacturers. The study therefore recommends companies to automate their scheduling process this will lead to fewer interventions by the management and therefore lowering any chances of delays. The study also suggests that companies can embrace the technology of Radio Frequency Identifications in boosting up their performance in regard to effectiveness and efficiency of manufacturing and performance of supply chain.

Clearing and forwarding management systems enhances performance of supply chain. The study recommends the government to adjust regulations and create a business environment that allows the process of clearing and forwarding to be efficient, straight forward and quick. here is also need for the government to develop systems and software that allows transparency and ease in submission of documents and therefore reduce the clearing time. It is also important for the government to ensure that there are clear regulations by custom department and ensure that the employees in this department are well knowledgeable of their task and are well organized and motivated to conduct their duties.

Information technology improves the relationship between logistics management systems and supply chain performance. The study therefore recommends management of FMCG manufacturers in Kenya to adopt different technologies in their operations to enhance performance. There is need for the company to conduct regular market research to identify any new technologies that can be applied in their field.

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