

**INFLUENCE OF LOGISTICS MANAGEMENT SYSTEMS ON SUPPLY CHAIN
PERFORMANCE OF FAST-MOVING CONSUMER GOODS MANUFACTURERS IN
NAIROBI CITY COUNTY, KENYA**

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ABSTRACT

Logistics is the aspect of planning, implementing and control of efficient and effective movement of goods and services and associated information from one place to another in order to meet consumer requirements. The automation of logistic management practices in firms is still very low in Kenya, despite its importance. A significant number of firms in Kenya are ignorant of information technology incorporation in logistics management and are unaware of their importance in conducting business, even in this era of globalization. Therefore, this study aims to establish the influence of logistics management systems on supply chain performance of fast-moving consumer goods manufacturers in Nairobi County, Kenya. Specifically, the study establishes the influence of warehouse management systems and inventory management systems on supply chain performance of fast-moving consumer goods manufacturers in Nairobi County, Kenya. The study focused on the logistics and IT managers of the 37 FMCG manufacturers located in Nairobi where a census was conducted on them to focus on 74 respondents. The questionnaires were pre-tested on a pilot set of 5 respondents for comprehension, logic and relevance. The study used a multiple linear regression model to test the significance of the influence of the independent variables on the dependent variable. Data analysis was carried out using statistical package for social sciences. The findings of the study were presented using charts, tables and figures. The study findings showed that the warehouse management systems and inventory management systems had a significant influence on supply chain performance of the firms. The study recommended that a similar research should be conducted with an aim at investigating the effects of logistics management systems on performance with other variables or of other firms in other sectors, including the service industry in the Kenyan market.

Keywords: *Warehouse Management Systems, Inventory Management Systems, Supply Chain Performance*

INTRODUCTION

This chapter presents the background of the study on logistics management systems and supply chain performance. The chapter also explains the statement of problem, the study objectives, scope of the study and justification of the study. According to Vitasek (2018) logistics is the aspect of planning, implementing and control of efficient and effective movement of goods and services and associated information from one place to another in order to meet consumer requirements. The dynamism in markets and competition in service and product provision has forced many businesses to look for innovative ways of delivering to their customers and revolutionizing the way business is done. Logistics encompasses all the information and material flows throughout an organization. It includes everything from the movement of a product or from a service that needs to be rendered, through to the management of incoming raw materials, production, the storing of finished goods, its delivery to the customer and after-sales service, (Ittmenn& King, 2016).

Furthermore, IT may further reduce existing wastes and inefficiencies along the supply chain through increasing real-time movement of shipment and operational control of logistics activities. However, increasing expenditure on IT in the supply chain process does not automatically result in higher firm performance. The use of inventory and order tracking systems by firms such as Wide Area Network (WAN), Extranet and Internet and ERP software improves supply chain performance. They seem to be catching up fast with their counterparts in the developed world. Wallinet *al.*, (2016) defined logistics as the part of a supply chain involved with the forward and reverse flow of goods, services, cash, and information. Managing of all transportation material handling, warehouse inventory, order processing and distribution, third-party logistics, and reverse logistics in supply chain improves the performance of companies.

Atzori, Iera and Morabito (2015) argue that 3PL firms in the United States have integrated logistics management systems in their operations through integration of Information Technology in inbound and outbound transportation management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third-party logistics (3PL) service providers in order to enhance their performance.

The same has been adopted by most manufacturing firms in the United Kingdom as argued by Waller and Fawcett (2018). According to Waller and Fawcett (2018), there are applications of big data in logistics in the following four areas: forecasting, inventory management, transportation management and human resources. Donlon (2017) further argued that manufacturing firms in the UK have automated logistics management systems that are interlinked so as to seamlessly operate thus increases effectiveness of logistics there by leading to a decrease in operation costs of the companies.

In Nigeria, companies are now equipped to make effective use of data, from warehouse management systems, which contain information on supplier/customer warehouse inventory levels and key customer ordering patterns and transportation management systems within which information pertaining to the location of important supply chain assets, such as products or vehicles is typically stored (Kolawole, Popoola & Akinseye, 2017). The integration of these systems leads to global inventory visibility which, in turn, leads to reduced costs and improved customer services by decreasing shipping and receiving cycle times, increasing shipment and

inventory accuracy, and decreasing lead time variably that all have impacts on logistics cost (Movahedi, Lavassani, & Kumar, 2019).

New technology in the supply chain can help improve supply chain agility, power up operation, reduce cycle time, achieve higher efficiency and deliver products to customer on time if implemented correctly (Kinuthia & Akinnusi, 2014). Integrating new technology into existing operations can help a lot in increasing customer service, reduce costs, and streamline supply chains (Kenneth & Laudon, 2017). IT has made it possible to track cargo and fleet for Logistic Firms. This has had a lasting impact on the security of both the cargo and fleet. In Kenya, the requirement by all truckers to install the Electronic Cargo Tracking System (ECTS) was initially met with opposition. However, truckers have slowly embraced the ECTS, which seeks to replace the security bond while monitoring cargo in transit and providing real time information on location, security and condition of cargo and assets (Bradawl, 2015).

Fast Moving Consumer Goods (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 (Mandrinou, 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, 2017).

Statement of the Problem

Despite its significance, logistics function in food and processing firms still face some challenges majorly because logistic operations are labor-intensive based and, as such, procurement managers spend considerable time on 'non-value-added activities' (Makau, 2014). The automation of logistic management practices in firms is still very low in Kenya, despite its importance. In Kenya, statistics indicate that more than 50% of logistical processes of firms in Kenya are still being carried out manually (Miheho, 2018). Mitullah and Odek (2015) indicate that a significant number of firms in Kenya are still lagging behind in the use of information technology incorporation in logistics management and are unaware of their importance in conducting business, even in this era of globalization.

Chege (2017) indicated negative trends as a result of structural issues such as struggling with low productivity and structural inefficiencies in the supply chains of fast consumer goods producers in Kenya. The World Bank's Enterprise Survey (2014) indicated that one of the biggest challenges faced by the seafood sector in the Kenyan coast for instance is high supply chain costs to the tune of 40% of the total costs. On the other hand, KAM (2014) reiterates that the declining performance is disturbing for business and indicates eroded competitiveness and compromises the government's aspirations of 20% growth that enabled Kenya to become prosperous. Whereas that is the case, Odhiambo (2013) argues that while most manufacturing firms in Africa are lagging behind most of the world's economies in tapping into the possibilities linked to the emerging technologies and have, in effect, failed to realize the full potential benefits of technology adoption, close to 40% of their cost would be saved through adoption of electronic logistics management.

Statistics by Consumer Insight (2017) indicated that Kenya is Africa's second biggest formalized retail economy after South Africa; the survey further indicates that 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 such as Cadbury Kenya closed down its Nairobi plant due to 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, there is a need for effective logistics management such as adoption of logistics management systems which can enhance supply chain performance.

This study seeks 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 supply chain performance of FMCG as well as Onyango (2017) who focused on the relationship between inventory management practices and supply chain performance of FMCG in Nairobi County. These studies have focused on FMCG but have not linked logistics management systems to its supply chain performance.

Objectives of the study

- i. To establish the influence of warehouse management systems on supply chain performance of fast moving consumer goods manufacturers in Kenya
- ii. To determine the influence of inventory management systems on supply chain performance of fast moving consumer goods manufacturers in Kenya

LITERATURE REVIEW

Institutional Theory

The proponent of this theory was Powell and DiMaggio in 1991. This theory is concerned with the processes by which structures, routines, rules and norms become established as the guidelines for acceptable behavior. Organizations act in a way that fulfills both customer and legal requirement. Pressures from these two parties influence the adoption of environmentally responsible behavior, (Laosiriet *et al.*, 2018). Organizations have institutionalized reverse logistics practices because of internal and external pressures. Pressures coming from copying what competitors do are what are called mimetic, as firms tend to adopt the successes of other similar one (Cox, 2015).

This reduces a number of costs that an entity is likely to incur when faced with (Barua, *et al.*, 2019). As Carter, Smeltzer and Narasimhan (2015) observed, companies institutionalize reverse logistics practices due to fear of loss of their market share to competitors and also awareness of the consequences of non-compliance with environmental imperatives. These challenges and pressures push firms to seriously consider the environmental effects while conducting their business. Managerial decisions to adopt environmental management initiatives maybe impacted by three institutional mechanisms: normative, coercive and mimetic, (Di Maggio & Powell, 1983).

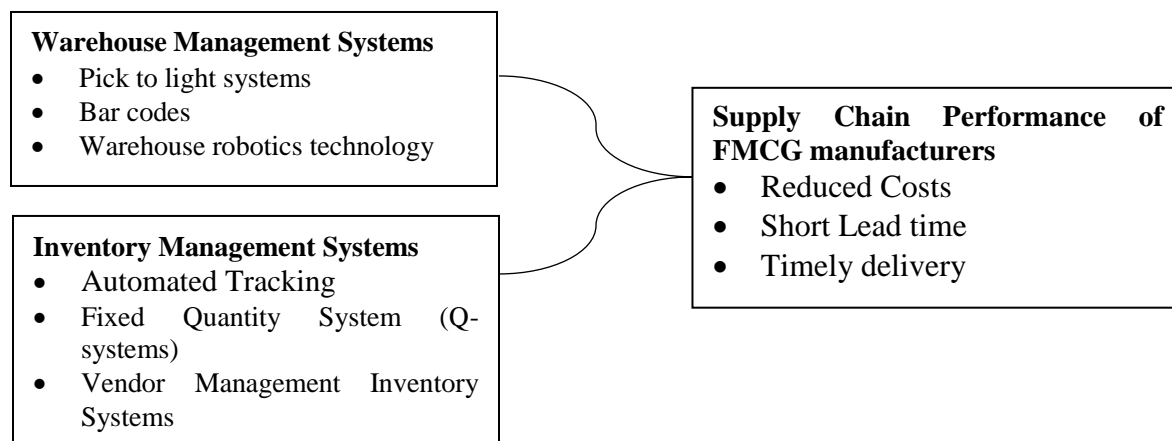
Technology-Organization Environment (TOE) Framework

The proponent of TOE framework was Tornatzky *et al.* in 1990. This model has three areas that an organization uses to determine how to take advantage of the new technology relating to e-business, which can influence the process of adopting, implementing and using technological innovations. These areas include: firstly; technological context. This refers to the existing as well as new technologies relevant to the firm. These include consideration factors such as: prior technology usage, and number of computers in the firm. In Organizational context; descriptive

measures about the organization include the scope, organization structure, size, financial support, managerial beliefs and managerial structure, (Chen *et al.*, 2016).

Similarly, Tornatzky *et al.* (1990) indicated that the descriptive measures in organizational context include; firm size; the centralization, formalization, and complexity of its managerial structure; the quality of its human resources; the amount of slack resources available internally; formal and informal linkages within and outside the firm; decision making and internal communication methods; and boundary spanning mechanisms to communicate with the external environment. Thus an organization replaces a new innovation in its processes with a view of improving the effectiveness and efficiency of its performance, (Mohamad & Ismail, 2019). In the technological context, TOE framework suggests a method of implementing a technology innovation which was referenced in the analysis of the deployment of the sustainability initiative.

Conceptual Framework



Empirical Review

Miralam (2017) carried out a study to examine the impact of implementing warehouse management system (WMS) on auto spare part warehouses activities in Saudi Arabia market. The findings of the study showed that the WMS provides high satisfaction of service reliability and great improvement in warehouse efficiency and effectiveness in spare part industry market. The study further revealed that WMS provides a reduction to the overall spare part industry market cost.

Mukolwe and Wanyoike (2015) sought to assess the effect of e-logistics management practices on operational efficiency at Mumias Sugar Company Limited, Kenya. The target population for the study consisted of 92 respondent's purposively selected using stratified sampling method. The sample was drawn from selected departments of Mumias Sugar Company, representatives of farmers, and officials from the Ministry of Agriculture and the Kenya Sugar board. Primary data was collected using structured questionnaires. The findings of the study revealed that automation of warehousing activities greatly enhances accuracy, speed of operations and reduces wastage. The study recommends a strategic approach to logistics management practices through embracing modern technology and employee training.

Osei-Mensah (2016) also conducted a study to assess the effect of inventory management practices on service delivery at St. Martin's Catholic Hospital. The study used descriptive research design with a sample of 60 staff and the data was collected using questionnaires. The

findings indicated that hospital ensures agreements with supplier for short cycle deliveries ensures accurate prediction of supplier delivery dates and operate Materials Requirements Planning system (MRP). The study also revealed that the hospital ensures Strategic Supplier Partnerships as an Inventory management practice and strictly uses Information Technology in its inventory management practices.

Okello and Were (2014) sought to examine the effect of logistics management practices on the performance of the Nairobi securities exchange's listed, food manufacturing companies in Nairobi. The study used survey research design. The target population for the study comprised of 20 food manufacturing companies. The study revealed that product development processes, inventory management, lead time, technology and innovation positively and significantly influence the performance of food manufacturing companies.

METHODOLOGY

This study adopted a descriptive research design for the purpose of accessing the study's general intent. The target population was 37 fast moving consumer goods manufacturers in Nairobi County. The sampling frame of the current study consists of a list of the 37 manufacturers of the FMCGs in Nairobi. The unit of observed the logistics and IT managers of these firms. This study adopted a census approach on all the 37 manufacturers of logistics firms since they are few. The study used primary data. The study uses self-administered questionnaires. Orodho (2008) argues that well standardized and tested questionnaires are most effective elements of a structured survey. The questionnaires were edited for completeness and consistency to ensure that respondents have completed them as required. The collected data was coded and entered into SPSS to create a data sheet that used for analysis.

RESEARCH FINDINGS

Response Rate

A total of 74 questionnaires were administered to the study respondents. The total number of questionnaires that were filled and returned were 64, representing an overall response rate of 86.5%. According to Finchman (2018) a response rate of above 70% is good enough for statistical analysis. This therefore justifies the present response rate for analysis.

Descriptive Results of the Study Variables

Warehouse management system

The first objective of the study was to determine the influence of warehouse management system on the first moving consumer goods in Nairobi County. The respondents were asked to rate statements on warehouse management system on a scale of 1 to 5, where 1 was Very low extent, 2 was Low extent, 3 was Moderate extent, 4 was High extent and 5 was Very high extent. The results of the study were as indicated in table 4.2. The findings reveal that majority of the respondents agreed that adoption of order fulfillment optimization technology, Adoption of pick to light systems to locate products and Adoption of put to light systems to store products to a very high extent as indicated by mean value of 4.63, 5.00 and 3.52 respectively.

Furthermore, the respondents indicated that the first moving consumer firms Adoption of automated handling equipment to move goods in the warehouse and the Adoption of warehouse robotics technology to carry goods in the store to moderate extent as shown by mean value of 3.38 and 3.19 respectively. On average, it can be concluded that warehouse management system is practiced to a moderate extent among first moving consumer goods as shown by an average

mean response of 3.94. The findings of this study are consistent with Homburg, Krohmer, Cannon and Kiedaisch (2002) who argued that despite its importance, warehousing management systems is not widely practiced in the first moving consumer manufacturing firms.

Table 1 Warehouse management system

Statements	Mean	Standard Deviation
Adoption of order fulfillment optimization technology	4.63	0.79
Adoption of pick to light systems to locate products	5.00	0.00
Adoption of put to light systems to store products	3.38	1.13
Adoption of automated handling equipment to move goods in the warehouse	3.19	1.23
Adoption of warehouse robotics technology to carry goods in the store	3.52	0.98
Average	3.94	0.83

Inventory management systems

The second objective of the study was to establish the influence of inventory management system on supply chain performance of fast-moving consumer goods. The respondents were asked to rate statements on inventory management systems on a scale of 1 to 5 where 1 was Very low extent, 2 was Low extent, 3 was Moderate extent, 4 was High extent and 5 was Very high extent. The results of the study were as indicated in table 4.3. It was established that majority of first moving consumer goods there is adoption of automated recording, the firm uses ABC analysis to make decisions on stock levels and the firm uses vendor management inventory system (VMI) to monitor customer's inventory usage to a moderate extent as shown by average responses of 3.44, 3.30 and 3.42 respectively. Furthermore, the findings revealed that most first moving consumer goods firms the firm uses point of sale (POS) to check the real time data of customer's inventory and there is adoption of fixed quantity systems to monitor stock levels to a high extent as shown by average responses of 4.03 and 3.92 respectively.

On average, it can be concluded that the inventory management systems among first moving consumer goods firms is at a moderate extent as shown by overall average mean response of 3.62. The findings of this study are consistent with Tangus, Yugi, Rambo and Rono (2015) who argued that at the moment, the first moving consumer goods is investing in technology to speed the supply chain process.

Table 2 Inventory management system

Statements	Mean	Standard Deviation
There is adoption of automated recording	3.44	1.26
The firm uses ABC analysis to make decisions on stock levels	4.03	0.78

The firm uses vendor management inventory system (VMI) to monitor customer's inventory usage	3.30	1.41
The firm uses point of sale (POS) to check the real time data of customer's inventory	3.42	1.29
There is adoption of fixed quantity systems to monitor stock levels	3.92	1.03
Average	3.62	1.15

Correlation Analysis

Table 3 Correlation Tests Results

		Warehouse management system	Inventory management system	Supply chain performance	chain
Warehouse management system	Pearson Correlation	1			
Inventory management system	Pearson Correlation	0.177	1		
Supply chain performance	Pearson Correlation	.370*	.265*	1	
	Sig. (2-tailed)	0.003	0.035		
	N	64	64	64	

The study findings revealed a positive and significant relationship between warehouse management system and supply chain performance among FMCG in Kenya ($R = 0.370$, $Sig < 0.05$). This therefore implies that an improvement in various indicators of warehouse management results to a significant improvement supply chain procurement performance among FMCG manufacturers in Kenya.

This finding is consistent with the study findings of Lasserre (2004) who highlighted that warehouse management systems was of crucial importance on improving supply chain performance. The correlation results also showed that inventory management system and supply chain performance among FMCG manufacturers are positively and significantly associated ($R = 0.265$, $Sig < 0.05$). This therefore implies that an improvement in various indicators of inventory management systems resulted to a significant improvement in the supply chain performance among FMCG manufacturers in Kenya. This finding is consistent with the argument by Eamonn *et al.* (2008) who revealed a positive relationship between better inventory management techniques and supply chain performance.

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.853	0.728	0.709	0.225164

The F statistic indicating the overall significance of the model is significant at 5% ($Sig < 0.000$) showing that the model was significant. The F calculated statistic of $39.464 > F(4, 159)$ critical value of 2.429 confirming that the model was significant. The model significance results therefore imply that the four independent variables of warehouse management system, inventory management system, Electronic order processing and transport management system adopted in the study are suitable factors in predicting variation in supply chain performance among FMCG firms in Kenya.

Table 5 Analysis of Variance (Model Significance)

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	8.003	2	2.001	39.464	0.000
Residual	2.991	61	0.051		
Total	10.994	63			

The regression results revealed that logistics management systems positively and significantly influenced supply chain performance among FMCG manufacturers Kenya (Beta = 0.191, Sig < 0.05). This implies that a unit increase in various indicators of warehouse management systems indicator resulted to 0.191-unit improvement in supply chain performance among FMCG in Kenya. The findings are consistent with Homburg, Krohmer, Cannon and Kiedaisch (2017) who established that warehouse management system improves supply chain performance thus leading to an improvement in the performance of the buyer.

The regression results on inventory management system further showed that this variable positively and significantly influenced supply chain performance among FMCG in Kenya (Beta = 0.122, Sig < 0.05) implying that a unit increase in inventory management systems indicators resulted to 0.122-unit improvement in supply chain performance among FMCG in Kenya. These results showed that inventory management systems are an important factor when a firm needed to improve its supply chain performance. The results agree with Sanders, Chad, Autry, David and Gligor, (2016) who indicated that inventory management systems sharing through better inventory management system leads to an improvement in supply chain performance of the organizations.

Table 6 Regression Coefficients Results

	Beta	Std. Error	T	Sig.
(Constant)	0.045	0.352	0.128	0.899
Warehouse management system	0.164	0.037	4.432	0.000
Inventory management systems	0.122	0.029	4.207	0.001

Conclusions

Based on the study findings, it was concluded that logistics management system is an important determinant of procurement performance among FMCG firms. It can be concluded that FMCG firms in Kenya need to invest in logistics management system activities such as pick to light systems, bar codes and warehouse robotic technology. These enhance the supply chain performance.

The study concluded that the inventory management systems also play an important role in enhancing supply chain performance among FMCG firms in the long run. It was concluded that there is a need for Automated Tracking, Fixed Quantity System (Q- systems), Vendor Management Inventory Systems these practices enhance the supply chain performance.

Recommendations of the Study

The study recommends that in order for improved procurement performance among FMCG firms in Kenya, there is need to focus and invest in logistics management system activities such as pick to light systems, bar codes and warehouse robotic technology.

The study also recommends that for the purpose of improvement in the procurement performance FMCG firms in Kenya, there is need for here is a need for Automated Tracking,

Fixed Quantity System (Q- systems), Vendor Management Inventory Systems these practices enhance the supply chain performance.

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