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## **EFFECT OF WAREHOUSE MANAGEMENT SYSTEMS ON SUPPLY CHAIN PERFORMANCE OF FAST-MOVING CONSUMER GOODS MANUFACTURERS IN KENYA**

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## EFFECT OF WAREHOUSE MANAGEMENT SYSTEMS ON SUPPLY CHAIN PERFORMANCE OF FAST-MOVING CONSUMER GOODS MANUFACTURERS IN KENYA

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### Abstract

**Purpose:** The purpose of this study was to establish the effect of warehouse management systems on supply chain performance of fast-moving consumer goods manufacturers in Kenya

**Methodology:** The study adopted descriptive research design. The unit of observation was the operations manager of the 51 FMCG manufacturers located in Nairobi. The sampling frame of the current study consisted of operations managers in the manufacturers of the FMCGs in Nairobi. The study used the census method to select 51 manufacturers of the FMCGs in Nairobi, thus the sample of the study was 51 respondents. Primary data was used in the study. The study used questionnaires to collect data. Mixed methods technique of analyzing data was used where both descriptive and inferential analysis were used. The data collected from the field was analyzed using SPSS 23 program. The questionnaires were referenced and the items in them coded for easier data entry. The presentation of the findings was done using tables.

**Results:** The study found that warehouse management systems positively and significantly influences Supply chain performance of FMCG in Kenya. The study found that the respondents were in agreement that warehouse management system helps to reduce picking errors; warehouse management system facilitates 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.

**Unique contribution to theory, practice and policy:** The study recommended that 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.

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

## 1.0 INTRODUCTION

Warehousing management systems is the use of technology in managing warehousing activities that involves storage or holding of raw materials, semi-finished/finished goods for different time periods as well as retrieval. Bhat (2011) explains the warehousing roles which include consolidation. It means collecting smaller quantity of goods and combining them in order to form large quantity for the purpose of lowering transportation cost. Some of the e-warehouse management systems are M2M, Order Fulfillment Optimization Technology, pick to light systems, put to light systems and warehouse robotics technology.

Machine-to-Machine Technology (M2M) helps in monitoring and streamlining all automated aspects of operations in the warehouse. Combining it with Warehousing management systems (WMS), newest eases equipment control of all equipment that are important in fulfilling a process in the warehouse. Order Fulfillment Optimization Technology on the other hand helps in maximizing productivity of order picking and boosting accuracy. Two key solutions exist; Pick-by-Light and Put-by-Light (Fan, Zhang& Zhang, 2015).

Pick-to-Light Systems applies the use of special light displays in directing warehouse operators to where products are located. This makes it much easy for operators to know the products they are to pick and the quantity. One of the characteristics of the systems is that they are very flexible and the technology has the ability of planning, controlling and analyzing volumes of picked orders. On the other hand, Put-by-Light systems help in directing operators on where and how they should allocate products in a warehouse. The systems are very efficient when it comes to picking from a bulk stock. This technology is considered ideal for retailing warehouse dealing with apparel, sporting goods, convenience foods, personal care items, general merchandise and groceries (Fan, Zhang& Zhang, 2015)..

This technology assists in collecting and trading information and provides managers of the warehouse with actionable information which can be applied in verifying operation procedures and expedites decisions (Bondarev & Zakirov, 2015). Another warehousing technology is the Voice Tasking Technology which is technology that is free of hands and applies the use of spoken command to pick, put, receive, replenish and ship the functions of the warehouse. The technology is similar to RF technology and has a flexible choice for fulfilling orders.

For the out bound logistics system, the warehouse receives consolidated volume of shipments from different plants and ship LTL to various markets. Owino (2013) further argues that it is important for the products be readily available to be delivered to customers on demand. By warehousing a product close to the customers, delivery time can be reduced, or off-the shelf supply can be achieved thereby improving customer's services. The faster, on time delivery can help increase sales.

Udeh and Karaduman (2015) did a research study on effects of supply chain (SC) in management systems of warehouse in automotive industry in Turkey. The study did measure the effects of improved WMS in SC of automotive industry. The study used a sample of 14 manufacturers of automotive who operate as Original Equipment Manufacturers and Automotive Components Manufacturers with the key focus being on production capacity, yearly sales, share in the market according to the company's annual report of 2013/2014. It was established that SCM in WMS assisted in improving efficiency and effectiveness of the entire company through

lowered operational costs, inventory levels and increased responsiveness to demand and therefore improving the organizational competitive advantage.

Mukolwe and Wanyoike (2015) conducted a research study with the aim of establishing the impacts of practices of e-logistics management on efficiency of operations in Mumias Sugar Company Limited, Kenya. The study selected a sample of 92 respondents using purposive sampling technique from each strata of the population. The study drew the sample from various departments in the company who represented the farmers, officials from Ministry of agriculture and Kenya Sugar board. Selected data collection tool was questionnaire. It was established that automating warehouse activities leads to improved accuracy, speedy operations and lowered wastage. It was therefore recommended that there needs to be strategic approach in practices of managing logistics by embracing modernized technology and training of employees.

Ramaa, Subramanya and Rangaswamy (2012) researched the effect of WMS on India's SC. The focus of the study was on the largest retail company dealing with consumer products. Sample used in the study was 60 retailing organizations and found that retailing companies with automatic WMS had witnessed reduction in cycle time to 773 minutes. Mungu (2013) carried out a research study with the aim of determining how application of practices of managing logistics can affect the level of stocks of essential drugs in public health institution. The study was conducted in the county of Bungoma where a sample of 15 health institutions was surveyed. It was found that practices of managing inventories, transport, and warehouse like quality control, labeling, clear specialization and pricing had positive impacts on level of stocks of essential drugs in the facilities.

### **Performance**

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).

Organization performance is a multidimensional construct operationalized by a variety of financial measures (which include sales, value of net assets and profit) and non-financial measures which include number of workers, market share and overall customer satisfaction. In addition, factors such as overall satisfaction and non-financial goals of the firms are also very important in evaluating performance. Organization performance cannot be adequately determined without considering both financial and nonfinancial measures (Alder, 2012).

According to Chesire and Kombo (2015), organizational performance comprises of three distinct areas of company results: Financial performance, commodity market performance and shareholder return. Harzing (2013) noted that an organization performance may essentially be a reflection of changes in the market size or financial conditions rather than sales figures alone. A company's performance in respect to competitors can be measured by its share in the market.

Firms try to build their business with respect to competitors essentially expanding their share in the market to profit from the economies of scale. Economies of scale can contribute in working up a cost advantage. Sales increase in a slow industry is the inspiration to enlarge the market share.

### **Fast-Moving Consumer Goods Manufacturers (FMCG)**

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 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, Smeltzer 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.

## **1.2 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 (Miheo, 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 METHODOLOGY**

The study adopted descriptive research design. The unit of observation was the operations manager of the 51 FMCG manufacturers located in Nairobi. The sampling frame of the current study consisted of operations managers in the manufacturers of the FMCGs in Nairobi. The study used the census method to select 51 manufacturers of the FMCGs in Nairobi, thus the sample of the study was 51 respondents. Primary data was used in the study. The study used questionnaires to collect data. Mixed methods technique of analyzing data was used where both descriptive and inferential analysis were used. The data collected from the field was analyzed using SPSS 23 program. The questionnaires were referenced and the items in them coded for easier data entry. The presentation of the findings was done using tables.

## **3.0 RESULTS**

### **3.1 Descriptive Findings**

#### **3.1.1 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 facilitates 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 warehouse 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 facilitates 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

### 3.2 Regression Analysis

From the finding presented in table 2, 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;

$$Y = 1.111 + 0.762 X_1 + \varepsilon$$

From the equation above, when warehouse management system is held to a constant zero, performance of supply chain will be at a constant value of 1.111. 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 2: Regression Analysis for Warehouse Management Systems**

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.880 <sup>a</sup>	.775	.770	.08440		
a. Predictors: (Constant), Warehouse Management Systems						
ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	1.105	1	1.105	155.198	.000 <sup>b</sup>
1	Residual	.321	45	.007		
	Total	1.426	46			
a. Dependent Variable: Supply Chain Performance						
b. Predictors: (Constant), Warehouse Management Systems						
Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
	(Constant)	1.111	.212		5.241	.004
1	Warehouse Management Systems	.762	.061	.880	12.458	.000
a. Dependent Variable: Supply Chain Performance						

#### 4.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

##### Summary

The study found that the respondents were in agreement that warehouse management system helps to reduce picking errors; warehouse management system facilitates 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.

### **Conclusion**

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

### **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.

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