

**ORIGINAL RESEARCH ARTICLE****Achieving zero hunger in Kenya: logistics management practices for enhancing organizational performance in agriculture and food authority****Fridah Chepleting¹, Gregory Namusonge¹ and Elizabeth Nabuswa¹**¹*Department of Procurement and Logistics, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya*Corresponding email: fridahchepleting@gmail.com**ABSTRACT**

This study sought to determine logistics management practices that may be leveraged to enhance the organizational performance of the Agriculture and Food Authority in Kenya (AFA). The study was motivated by Sustainable Development Goal 2, which advocates for zero hunger in the United Nations member states. The study was grounded in the lean theory that advocates the pull approach. The research design adopted by the study is the explanatory research design that is anchored in the post-positivist research philosophy. The study targeted 623 staff of the AFA, drawn from fifteen silos under its management. Stratified and simple random sampling techniques were used to select a sample of 380 employees. Structured questionnaires were developed and used to collect data. The standard multiple regression approach was used to analyze the collected data. The analysis results confirmed that the three components of logistics management, namely; inventory management, transport management, and warehouse management, were positive and significant predictors of operational efficiency of the AFA tested at the 95% level of confidence. The study concluded that inventory management, transport management, and warehouse management are practices that could place the AFA in a good position to realize zero hunger in Kenya. However, the study adopted appropriate measures in both policy and managerial recommendations that the food agencies should embrace in enhancing the implementation of the best and most efficient supply chain management practices at the disposal of organizations' performance. Future studies endeavor to identify other logistic management practices that can be complementary to the three identified in this study in enhancing the AFA's potential to achieve the zero hunger goal.

Key words: Organizational performance, inventory management, transport management, warehouse management, zero hunger

1.0 Introduction

Sustainable development provides a paradigm shift in development that focuses on a future where there is a balance in societal, economic, and environmental considerations to improve quality of life (Basera, 2016). Sustainable development as a concept has its roots in the Bruntland Commission report, which advocated for development that satisfies the



expectations of the present generation without jeopardizing the chances of future generations to meet their own needs (Jarvie, 2016). The Bruntland report identified economic growth, environmental protection, and social equity as pillars for sustainable development.

The focus on the achievement of a sustainable future has occasioned a shift from Millennium Development Goals (MDGs) to Sustainable Development Goals (SDGs). It is argued that the SDGs, which were ratified by all member states of the United Nations (UN), provide the framework on which to leverage the 2030 Agenda for Sustainable Development (UN, 2015b). The agriculture supply chain is therefore a critical value chain in the realization of sustainable development. Through SDG goal 2, the UN member states acknowledge that achieving zero hunger is the bedrock for food security and the promotion of sustainable agriculture (UN, 2015b).

Organizational performance of the agricultural supply chain as facilitated by the AFA becomes of interest if Kenya has to realize its desire to achieve zero hunger. Organizational performance is the extent to which changes in firm operations involving activities such as cycles of cash conversion, ratio of operating expenses to sales revenue, firm size, ratio of total debt to total assets, and total asset turnover influence the future performance of a firm. (Gill et al., 2014). Indeed, operational efficiency in the supply chain has been identified as a supply chain optimization strategy that can enhance end-to-end visibility and lead to the realization of zero hunger (Sithole, Silva & Kaveji, 2016). Moreover, evidence shows that operational efficiency in the agricultural supply chain sustains agricultural extension systems, paving the way for improved efforts toward ensuring zero hunger (Allahyari & Sadeghzadeh, 2020).

However, the performance of the AFA has been called into question, particularly by the Council of Governors, which argues that Kenya requires better laws to increase food production (CoG, 2019). The bone of contention has been that many counties have seen a 10–25 percent reduction in agricultural productivity due to the non-realignment of the Crops Act No. 16 of 2013 and the AFA Act No. 13 of 2013 with the new constitution to give governors autonomy to discharge their responsibilities. Of great concern to the governors is that the AFA has not provided enough extension staff to farmers, enough structures for grain storage, and that, with the poor transport infrastructure in rural areas, the AFA has not made enough efforts to reach rural farmers (CoG, 2019).

One key supply chain practice that the Council of Governors has associated with the laxity in the performance of the AFA is logistics management. They are of the view that inventory management practices such as transportation, inventory, and warehousing have not been given attention. In most counties, there is a shortage of facilities such as silos, and if available, they are in a dilapidated state that does not support proper inventory. Moreover, rural farmers are left to struggle with getting products to the market due to a poor road network. This enables brokers to take advantage of farmers. Suffice it to say that logistics management practices have been found to have a positive impact on the operational efficiency of fast-moving consumer goods manufacturing companies in Kenya (Gitonga, 2017); organizational

performance in the context of Dangote flour mills PLC in Nigeria (Ajoke et al., 2019); operational efficiency of companies drawn from various sectors in Macedonia (Ristovska, Kozukarov & Petroski, 2017); and the organizational performance of shipping firms in the Kenyan context (Kirui & Nondi, 2017).

There is no doubt that investment in agriculture provides a platform for Kenya to realize zero hunger as postulated in SDG goal 2. The operational efficiency of the AFA is perhaps one way in which investment in agriculture can be achieved. Despite there being an array of logistics management practices, the practices of managing inventory, transportation, and warehousing provide the greatest challenge to farmers in Kenya, especially on rural farms. This paper, therefore, examined logistics management practices that could be exploited to enhance the operational efficiency of the AFA and attain zero hunger in Kenya. In particular, the study analyzed the single and collective effects of inventory management, transport management, and warehouse management on the operational efficiency of the AFA.

1.1 Organizational performance

Organizational performance is perceived as the sensible and profitable utilization of scarce resources in institutional, commercial, and industrial undertakings (Dhillon & Vachhrajain, 2012). Organizational performance is therefore a concept that seeks to maximize product quality while maintaining waste at a lower minimum (Ohene-Asare, Turkson & Afful-Dadzie, 2017). Prasad approaches the firm's performance from business management and profit generation perspective and posits that performance tests the organizational capacity to use available income prudently to generate profit (Prasad as cited in Dhillon & Vachhrajain, 2012).

On the contrary, Andrew and Chia-Yen (2012) view organizational performance as a measure of the survival of organizations on the strength of activities undertaken. They contend that the concept is achieved if organizations take cognizance of the need to balance between profit and return on investments; achieve operational excellence; remain accountable both to society and the environment, and adapt to the needs of the customer and the public at large. The definition of organizational performance in the context of the Agriculture and Foods Authority (AFA) is therefore premised on the definition by Andrew and Chia-Yen (2012) and leans more towards the effectiveness of activities undertaken.

The AFA brings together the coffee, tea, sugar, horticultural crops, fiber crops, nuts and oil crops, food crops, and pyrethrum and other industrial crops directorates (AFA, 2016). The authority is, among other functions, tasked with the administration of the Crops Act 2013, promotion of best practices in the agricultural supply chain, maintaining a database of data on agricultural products excluding livestock products, controlling agricultural research, and advising the national and county governments on matters related to agriculture (GoK, 2013). The operational efficiency of the AFA in this study was therefore operationalized as activities are undertaken to, among others, reduce regulatory bureaucracy, reduce cost, minimize overlap of functions, and improve decision making. Achievement of these activities must, however, take into account how the authority manages logistics.

1.2 Logistics Management

Karimi & Rafiee (2014) found that supply chain practices have been found to have significant impacts on organizational performance as well as on the realization of competitive advantage (Karimi & Rafiee, 2014). One such practice is logistics management, which relates to the planning and organization of activities for the effective implementation of processes (Mellatparast & Spillan, 2014). Two categories of logistics, inbound logistics and outbound logistics have been delineated (Marques et al., 2020). According to Lambert and Burduroglo, inbound logistics is associated with material procurement, handling, storage, and transportation, while outbound logistics is associated with the collection, maintenance, and delivery of the product to the consumer.

Logistics management as a supply chain practice has become significant in doing business and integrates the movement of goods, information, services, and capital, right from material sourcing to consumers (Springinkle & Wallenburg, 2012). According to Ghomrassi and Tigu (2019), logistics management provides the right product, having the required quality, in the right place, at the right time, and the right price. Logistics management is therefore committed to facilitating inventory control, transport management, and warehousing (Ristovska, Kozuharov & Petkorski, 2017). Logistics management in this study was therefore measured using three variables: inventory management, transport management, and warehouse management.

2.0 Materials and method

2.1 Target population

The target population was the staff of the fifteen silos under the management of the AFA. This target population was comprised of 15 managers, 124 heads of departments, and 384 general employees. The total target population was therefore 523 staff. Using the sample formula employed by Taherdoost (2017), the population was narrowed down to a sample of 380 individuals, consisting of 9 managers, 56 heads of department, and 315 general staff. Data was collected using a structured questionnaire that had five sections in line with the four study variables and respondents' background characteristics. The sample size for the current study was founded on the formula recommended by Zikmund et al. (2013).

Thus the sample size is given by: $n_0 = \frac{z^2 pq}{d^2}$

$$n_0 = \frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2} = 722$$
$$n = \frac{722}{1 + \frac{722}{822}}$$
$$n = 380$$

2.2 Data Analysis

The data was analyzed using the standard multiple regression approach. In this approach, operational efficiency was regressed on the three logistic management variables, yielding a model of the following:

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

Where Y = Operational efficiency

X_1 = Inventory management

X_2 = Transport Management

X_3 = Warehouse Management

β_0 Is the unknown intercept

β_1 Is the effect of inventory management on operational efficiency

β_2 Is the effect of transport management on operational efficiency

β_3 Is the effect of warehouse management on operational efficiency

ε = residuals

3.0 Results and discussions

Multicollinearity assumptions were satisfied as demonstrated by variance inflation factors (VIFs) below 10 (1.04 – 1.149). Similarly, the assumptions of normality were also satisfied, as shown by skewness values in the range of -0.709 to -0.081 and Kurtosis statistics ranging from -0.383 to 0.149. Meanwhile, the assumption of independence of observations was confirmed by a Durbin-Watson value of 1.903.

The descriptive statistics (Table 2) confirmed that the mean response stores across the four variables averaged 4.0 while the standard deviations were below 1. This was a clear indication that respondents were consistent in their agreement that the AFA was showing high levels of operational efficiency and logistics management practices. Meanwhile, the skewness and kurtosis statistics indicated normal distributions across the data sets.

Table 2

<i>Descriptive Statistics</i>						
Variables	Mean	Std. Deviation	Skewness		Kurtosis	
			Statistics	Std. Error	Statistics	Std. Error
Operations efficiency	4.20	.448	-.081	.139	-.372	.277
Inventory management	4.11	.544	-.473	.139	.011	.277
Transport management	3.98	.616	-.591	.139	-.383	.277
Warehouse management	3.91	.634	-.709	.139	.149	.277

Source: Survey data (2021)

The multiple regression output for regressing operational efficiency on the logistics management variables shown in Table 3 revealed the following: The overall model was significant, $F(3,304) = 29.718$, $p < 0.001$, $R^2 = 0.227$. The predictors were significant; with inventory management, $b = 0.274$, $t(304) = 6.141$, $p < 0.001$ implying that for every 1 unit increase in inventory management, there was a 0.274 increase in operational efficiency of the

AFA; for transport management, $b = 0.135$, $t(304) = 3.499$, $p < 0.05$ implying that for every 1 unit increase in transport management, there was a 0.135 unit increase in operational efficiency; and for warehouse management, $b = 0.101$, $t(304) = 2.776$, $p < 0.05$ implying that for every 1 unit increase in warehouse management, there was a 0.101 units increase in operational efficiency. The variance explained by logistics management in the variation of operational efficiency was, however, a mere 22.7% ($R\text{-sq} = 0.227$).

*Table 3
Regression Output*

R	R-sq	SE	df	F	Sig	Durbin-Watson	
.476	.227	.396	3,304	29.718	.000	1.903	
Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	2.144	.225		9.537	.000		
Inventory management	.274	.045	.332	6.141	.000	.870	1.149
Transport management	.135	.039	.186	3.499	.001	.902	1.108
Warehouse management	.101	.036	.143	2.776	.006	.959	1.042

a. Dependent Variable: Operations efficiency

Source: Survey data (2021)

The researcher concluded that operational efficiency in the AFA could therefore be modeled by the equation.

$$Y = 2.144 + 0.274X_1 + 0.135X_2 + 0.101X_3 + 0.396$$

Where X_1 – Inventory management

X_2 = Transport management

X_3 = Warehouse management

4.0 Discussions

The study confirmed that logistics management is a critical facet of the organizational performance of the AFA and can be leveraged upon to achieve food security and the realization of zero hunger in Kenya. Logistic management components of inventory management, transport management, and warehouse management were found to have positive and significant effects on the operational efficiency of the AFA.

The findings of this study possess huge implications for the theory and practice of operational efficiency from a logistics management perspective. From a theoretical perspective, the findings underscore the importance of lean theory in optimizing available resources using the right set of activities (Radnor, 2010). The activities undertaken under logistics management

have the potential to enable the AFA to simplify and organize its working environment in a manner that reduces waste, operational costs, and optimizes equipment and working space. In doing so, the authorities would be in a position to deliver agricultural products and services better, faster, and cheaper, consistent with the ideals of lean theory (Abu Salim et al., 2018).

By introducing lean processes such as designated reorder points, service level, lead time, and inventory accuracy into inventory management, the AFA has an opportunity to be in a position to reduce holding costs, compute required stock to avoid stock-out, and conduct an inventory headcount to verify the accuracy of internal data. Similarly, lean processes such as on-time pickup and delivery, fuel efficiency, and maintenance, among others, when employed in transport management, have the potential to enable stakeholders to make plans for goods reception, create a sustainable supply chain, and know when to replace part or all of the fleet.

From a managerial perspective, the findings are important in the sense that they highlight critical logistics management components that can be harnessed to improve the operational efficiency of the AFA. This knowledge is particularly useful to the government of Kenya, through the relevant ministry, in its desire to realize SDG goal 2 of zero hunger.

The study, for instance, established that inventory management, measured through holding costs, service level, lead time, rate of return, and perfect order rate; transport management, measured via on-time pickup and delivery, fuel efficiency, loading and unloading times, maintenance, and damage; and warehouse management, measured through receiving, putting away, storage, pick & pack, and distribution were positive and significant predictors of operational efficiency of the AFA. This knowledge is particularly useful to silo managers and other agricultural stakeholders in their desire to improve service delivery while minimizing cost. The study highlights activities that can be undertaken in every component of logistics management to enhance operational efficiency. Although several studies have previously highlighted the positive impacts of logistics management on firm performance (Mukolwe & Wanyoike, 2015; Ristovska, Kozuharov, & Petkovski, 2017; Timna, 2017), none of them has identified activities to be undertaken in each logistics component. This study was therefore a novel one in making such a contribution to the existing discourse.

5.0 Conclusions and Directions for Future Research

Logistics management through inventory management, transport management, and warehouse management is a vital element in the achievement of organizational performance in the AFA. Through logistics management, the AFA can, among other things, lower holding costs, increase service level, lower rate of return, increase on-time pickup and delivery, improve fuel efficiency, reduce loading and unloading times, and improve its distribution network. The three logistics management practices of inventory, transportation, and warehousing have a positive and significant effect on the operational efficiency of the AFA. The AFA should seek to leverage these practices, which have posed greater challenges to rural farmers, to increase their performance. Enhanced organizational performance in the AFA gives hope of increased food security and the realization of zero hunger in Kenya. However, the small



proportion of variance explained in the performance of the organization occasioned by the variation in logistics management variables is an indicator that other supply chain practices need to be examined. The AFA and other stakeholders need to put in place strategies to improve inventory, transport logistics, and storage facilities to facilitate improvement of the AFA supply chain. Meanwhile, future studies ought to focus on identifying other logistic management practices that can impact positively on the operational efficiency of the AFA to boost the chances of Kenya attaining SDG goal 2.

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6.2 Declaration of interest

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6.4 Conflict of interest

The authors declare no conflict of interest.

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