

FACTORS INFLUENCING LOGISTICS PERFORMANCE IN MOMBASA PORT

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Abstract: Logistics management is the part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements. Logistics management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning and management of third party logistics services providers. The purpose of this study was to investigate the factors influencing the performance of logistics management in an organization. Four specific objectives formed the basis of study and these were: to examine the effect of information technology, infrastructure, staff competency and custom clearance on the performance of logistics management in an organization. The theories studied included resource based review theory and theory of constraints. The study employed descriptive and inferential research designs. The target population for the study was 108 respondents from respective departments from KPA and other key players in the port. The sample size for the study was 85 respondents which was calculated from the target population using Neyman formula. Data collection was done using questionnaires method. Data analysis and interpretation was based on descriptive statistics as well as inferential statistics mainly regression analysis and Pearson correlation which was employed during analysis of data. From the finding, information technology was believed to be responsible to be a catalyst for the proper changes that are taking place at the port. Staff competency is one of the issue that helps the entire organization to run smoothly in regards to manpower for the entire activities taking place. Infrastructure in any port capacity they have to invest heavily in modern and mechanized infrastructure that facilitates faster movement of cargoes and products from one point to another. It is recommended that for the performance of logistics management to be effective adequate investment in ICT to facilitate flow of information in response to ever changing customer tastes preferences is central to any business and use of technology is essential to any business that wants to gain competitive advantage. The organization should come up with a policy on the how well to guide the managers and implementers of these activities since they are the mirror into the business competition. The study recommends more investment in this area. Like in the infrastructure, a policy should be put in place on what to be included in the infrastructure and the benefits be communicated to the stakeholders, including both the country and the citizens. The process of custom clearance should be enhanced by integrating all systems to ensure a smooth and efficient logistic delivery at the port. It is also recommended that there is also need to reduce, simplify and standardize trade documentation to reduce cost of trade.

Keywords: Information Technology, Staff Competency, Infrastructure, Custom Clearance and Logistics Performance.

1. INTRODUCTION

Objectives of the Study:

General Objective:

The general objective of the study was to evaluate the factors affecting the performance of logistics management at Mombasa port.

Specific Objectives:

The study was guided by the following specific objectives:

- i. To explore the effect of Logistics information technology on performance of logistics management at Mombasa port.
- ii. To analyze the effect of Logistics staff competence on performance of logistics management at the Mombasa port.
- iii. To determine the effect of Logistics infrastructure on performance of logistics management at the Mombasa port.
- iv. To evaluate the effect of Logistics custom clearance on performance of logistics management at the Mombasa port.

2. THEORETICAL FRAMEWORK

Resource Based View Theory:

Resource based view aspired to explain the internal sources of a firm's sustained competitive advantage (Spender, & Groen, 2013). The Resource Based View (RBV) of the firm postulated that, resources internal to the firm were sources of competitive advantage (Eyaa, & Derek, 2014). Such resources were valuable, rare, unique and difficult to substitute. Resources believed to be valuable were those that were capable of facilitating conception or implementation of strategies that improved performance, exploited market opportunities or neutralized impending threats (Barney & Clark, 2014). The two assumptions for RBV theory were, resources and capabilities were heterogeneously distributed among firms; and resources and capabilities were imperfectly mobile, which made firms' differences remained stable over time (Karia & Wong, 2011).

Game Theory:

Game theory is the formal study of decision-making where several players must make choices that potentially affect the interests of the other players; it is official study of conflict and cooperation (Pan & Ballot, 2013). Game theoretic concepts apply whenever the actions of several agents are interdependent (Dai & Chen, 2012). These agents may be individuals, groups, firms, or any combination of these. The concepts of game theory provide a language to formulate structure, analyze, and understand strategic scenarios (Dai & Chen, 2012). According to (Xu, et al., 2013) the game theory is divided into two main approaches: the non-cooperative and the cooperative game theory. The cooperative game theory can be applied to the case where players can achieve more benefit by cooperating than staying alone (Xu, et al., 2013).

Review of Literature Variables:

Logistics Information Technology:

In today's competitive environment, effective and timely responses to ever-changing customer tastes and preferences have become essential components for successful business performance (Han & Trienekens, 2015). In achieving performance, information flow comes in handy. (Harisson & Hoell, 2013) information flow was defined as the flow of data in different directions with variable contents between various data base (department) within a company. In 2008, the port entered the second phase of its ICT strategy by unveiling the Kilindini Water Front Terminal Operating system (KWATOS). This allowed key port operational areas to be automated including container, conventional cargo and marine operations in the Port of Mombasa as well as operation of the Nairobi and Kisumu inland container depots.

Logistics Infrastructure:

SC system relies on a single piece of equipment for operations in the container yard and serving the ships, the system can be divided into SC direct and SC relay systems, base on the ways of transporting containers between apron and yard. In the SC direct system, the SCs directly access the box from the quay crane and move them between quayside and container yard, and load/unload containers to/from truck/tractor. Whereas in the SC relay system, boxes are transferred by yard tractor/trailer units, and the SC picks up the boxes from the roadway and move along the rows to stack them on the yard.

Logistics Custom Clearance:

For scanning the container is loaded on a truck and passed through the scanning machines either in the port or at the Container Freight Station. If the scanning image shows any irregularities, customs will usually proceed to do verification. For customs verification containers have to be placed down, opened and stripped. If verification is to be performed at a Container Freight Station, all cargo has to be transferred to the respective Container Freight Station by the Container Freight Station operator (Bryson, 2015). Achieving a smooth and efficient logistics delivery at the port only reduces the cost of import but is vital to producers to be able to participate in global production circles and eventually move into new

business opportunities. Improving port performance includes several dimensions: enhancement of human resource and machine operation capabilities, the development or rehabilitation of the physical infrastructure, and the streamlining of trade related procedures customs. (Cochran, 2016).

Logistics Staff Competency:

Training is the systematic development of knowledge, skills and attitudes (KSA) required to work effectively. Training aims to change behavior. It is an agent of change. According to Crawford (2015), the definition of competence has attracted debate by many researchers. This research however adopts a definition by Caupin et al (2016), which defines competence as a combined set of an individual’s knowledge, abilities, personal characteristics used to perform a specific task or activity. Competency is also defined as “cluster of related knowledge, attitudes, skills and other personal characteristics; that correlates with performance of the job and can be improved through training. (Crawford, 2014), model classify the competence into input, personal an output, for which he describes input as knowledge and understanding, skills and ability.

3. RESEARCH METHODOLOGY

Research Design:

This is a case study research design where quantitative methods of data collection was used. According to Paton (2010) a case study seeks to describe a unit in detail, in context and holistically. A case becomes particularly useful when one can identify a case rich in information- rich in the sense that a great deal can be learnt from a few examples of the phenomenon under study. Data collected will be in the form of numbers and statistics using a structured questionnaires

Target Population:

The study targeted 108 respondents from operations department, CFS operators, clearing and forwarding agents and KRA staff with port operations background. Mombasa port is selected as a case study because of proximity to the researcher, time availability for research and budgetary constraints. The study targeted the respondents from the various departments because they are the ones making policies and decisions and they provided viable information on really issues influencing logistics performance in the port context thus giving them upper hand on the respective parameters in the logistics.

Sample Size and Sampling Technique:

Sampling is the process of selecting a number of individuals or objects from a population such that the selected group contains elements representative of the characteristics found in the entire population. Sample is a small group of objects or individuals selected or drawn from a population in such a manner that its characteristics represent population characteristics The researcher will use Neyman allocation sample formulae to calculate the sample size;

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, e is the level of precision. 95% level of confidence will be used which gives p = 0.05 chance of deviation from the actual. The equation is therefore;

$$n = \frac{108}{1 + 108 (0.05)^2}$$

n = 85

Table 1: Sample Size

Category	Target Population	Sample Size
Operations Department	53	40
CFS Operators	25	21
Clearing & Forwarding Agents	17	13
KRA Staff with port Operations background	13	11
Total	108	85

Data Processing, Analysis & Presentation:

Kothari, (2012) argues that data collected has to be processed, analyzed and presented in accordance with the outlines laid down for the purpose at the time of developing the research plan. Data analysis involves the transformation of data into meaningful information for decision making. It involved editing, error correction, rectification of omission and finally putting together or consolidating information gathered. The collected data was analyzed quantitatively. Descriptive and inferential statistics was done using SPSS version 22 and specifically multiple regression model was applied.

4. RESEARCH FINDINGS AND DISCUSSIONS

Descriptive Results:

Logistics Information Technology:

The results indicates that most respondent that participated in the research had an insight on electronic order document processing. This is depicted by a mean score of 3.74 and standard deviation of 1.792. The results were consistent with the findings of Singh (2010) who asserted that most ports use advanced technology to enhance the logistic performance of the port thus making information technology as a vital strategy tool to enhance the performance.

Logistics Staff Competency:

To some extent respondents with a mean score of 3.82, agreed that the parastatal have developed and initiated better training programs to enhance performance at the port. This statement is in agreement with Wamae (2014) that there is a direct correlation between level of education on a particular field and the performance and this has greatly contributed to logistic management at Mombasa port. With a mean score of 3.75 and standard deviation of 1,634, respondents agreed that there would be a reduction of costs and increased performance if much is invested in trained staff.

Logistics Infrastructure:

The respondents were in agreement that investment in automated machines and other equipment, has reduced time of loading and offloading, this shown by respondents mean score of 3.78 and standard deviation of 1.762. As to whether port has invested much in road and railway networks which has enhanced delivery of cargoes from one point to another, the respondents were in agreement with this statement with a mean score of 3.47 and standard deviation of 1.891. The findings were consistent with the findings by Jamal et. Al., (2008) who reported that the logistics performance of ports was illustrated through reflections obtained on the well-articulated issues of investing in proper infrastructure which is a catalyst of port performance.

Logistics Custom Clearance:

Most of the respondents were in agreement that custom clearance has transformed online systems through online customer feedback mechanism and complaints very fast (mean= 3.90), the introduction and usage of single window system has reduced congestion at the port (mean=3.82). They also agreed that KRA plays a critical part in clearance of cargoes at the port (mean=3.44), custom clearance and verification process is very fast and efficient due to high investment and usage of information technology system (mean=3.36), and finally the respondents were in agreement that port clearance systems are efficient and effective in handling and storage machines being used (mean=3.31). This statement is in agreement with Olendo (2016) that ICT creates transparency and builds super-customer relationship.

Correlation and Regression Analysis:

Coefficient of Correlation:

To establish the relationship between the independent variables and dependent variable. The study conducted correlation analysis and as indicated in the table above, information technology and performance has a positive correlation of value 0.89. Performance was found to be positively correlated to staff competency with a correlation value of (0.082), infrastructure and performance show a correlation figure 0.259 and custom clearance and performance shown by correlation figure of 0.377. This showed that there was a higher correlation in staff competency and performance. No negative correlation was noted (Michael, 2015). The calculated significant value of 0.0494 is less than the threshold of 0.05 hence indicating the influence of staff competency is significant in determining logistics performance. The results replicates that logistics performance at Mombasa port can be enhanced through investing in better trained personnel, advanced technology and having best customs clearance services that initiate efficiency and effectiveness.

Table 2: Correlation Analysis

		Performances	Information Technology	Staff Competency	Infrastructures	Custom Clearance
Performances Correlation	Pearson					
	1					
	Sig. (2-tailed)					
	N	72				
Information Technology	Pearson					
	Correlation	.089	1			
	Sig. (2-tailed)	.000				
	N	72	72			
Staff Competency	Pearson					
	Correlation	.082	.336*	1		
	Sig. (2-tailed)	.000	.004			
	N	72	72	72		
Infrastructures Correlation	Pearson					
	.259*	.430*	.733*	1		
	Sig. (2-tailed)	.000	.000	.000		
	N	72	72	72	72	
Custom Clearance	Pearson					
	Correlation	.377*	.732*	.505*	.738*	1
	Sig. (2-tailed)	.001	.000	.000	.000	
	N	72	72	72	72	72

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

Source : (Author, 2017)

Coefficient determination

Coefficient determination describes the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (performance) that is explained by all independent variables. From the findings his meant that 23.8% of performance relationship are attributed to the combination of the four factors investigated in this study.

Analysis of Variance (ANOVA)

Table 3: Analysis of Variance

Table: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.487 ^a	.238	.192	3.916

a. Predictors: (Constant), Custom Clearance, Staff Competency, Inform Tech, Infrastructures

Source: (Author, 2017).

From the above table the coefficient of determination, R² was found to be 0.238 which means that there was 23.8% variation in logistics performance due to changes in information technology, staff competency, infrastructure and custom clearance. The correlation coefficient tells us the strength of relationship between the variables. The study found that the correlation coefficient was 0.487 thus there was a fairly moderate positive relationship between the independent variable and the dependent variable (Hair et al., 2015).The low R² equally confirmed that there was a moderate positive correlation between the variables and performance only with 23.8% of the logistics management performance changes depending on the changes in the independent variables.

The four variables studied explain 23.8% of variance in the effect of logistics management on the logistics performance as represented by the R². This means that the other factors not studied contributes 76.2% of variance in dependent variable which clarifies for further studies to be done on the effect of logistics management on the port performance at Mombasa Port. The results implies that very small percentage based on the variables contributed to logistics performance at Mombasa port.

Regression Analysis:

Table 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	320.174	4	80.043	5.219	.001b
	Residual	1027.479	67	15.336		
	Total	1347.653	71			

a. Dependent Variable: Performances

b. Predictors: (Constant), Custom Clearance, Staff Competency, InformTech, Infrastructures

Source, Author (2017)

Multiple Regression Analysis

Regression analysis was undertaken with respect to performance as dependent variables and the other four independent variables; information technology, staff competency, infrastructures and custom clearance. The Multiple linear regression analysis is a general statistical technique used to analyze between a single dependent variable and several independent variables (Hair et al., 2015). It is one of the most extensively used multivariate statistical techniques for testing hypothesis and predicting values for the dependent variables. The regression coefficients result for this study are presented in table 5.

Table 5: Regression Coefficients

Model	Coefficients	Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	18.970	2.319		8.180	0.000
	InformTech	0.316	.123	0.418	2.574	0.000
	Staff Competency	0.158	.162	0.154	0.974	0.000
	Infrastructures	0.011	.114	0.021	0.100	0.000
	Custom Clearance	0.526	.148	0.777	3.564	0.001

a. Dependent Variable: Performances

Source: (Author, 2017)

From the result in table 5, the study established the following regression model

$$= 18.970 + 0.316X_1 + 0.158X_2 + 0.011X_3 + 0.526X_4 + e$$

From the above established regression model, the study found the holding all the four factors to constant zero, logistics performance of the port would be 18.970. A unit increase in information technology would lead to an increase in performance by factor 0.316 units holding other factors constant. A unit increase in staff competency would lead to an increase in performance by 0.158 units holding all other factors constant. In addition an increase in infrastructure would lead to an increase in performance of logistics management by factor 0.011 units, holding others constant. Finally, a unit increase in custom clearance would also lead to an increase in logistic management by 0.526 units. This information shows that there's positive relationship. The results shows that there's a positive relationship between information technology, staff competency, infrastructures, custom clearance and performance of logistics management. At a 5% level of significance and 95% level of confidence, logistics performance had a 0.000 level of significance, information technology 0.005 while staff competency, infrastructure and customs clearance had a 0.000 level of significance.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATION

Summary of Findings:

Logistics Information technology:

From the study information technology variable has a significant influence on performance of logistics management as a factor. Therefore, management in various organizations are advised consider this factor as vital in terms of top priority issues in the performance of logistics management in organizations.

Logistics Staff Competency:

From the analysis, it can be deduced that human resource development through training, equips them to possess necessary skills, knowledge and abilities to be efficient and effective (Pinto & Walker, 2015). This is evidenced by respondents' high mean score of 3.94 and 3.82 agreeing that the port have invested in better experienced staff and well trained to initiate high performance at the port and that it has developed and initiated better training programs for staff to enhance performance. This is critical for contributes substantially in performance of logistics management at the port. This is significant in any organization in terms of ensuring they have competent personnel.

Logistics Infrastructure:

The impacts of port infrastructure investments such as shipyards, docks, harbors, warehouses, inspection facilities and commercial cargo-loading sites have risen in importance this is evidenced by respondents rating with a mean score of 3.78, that the port has invested much in use of automated machines and equipment which has reduced time of loading and offloading. Empirical evidence underlines that port infrastructure investment projects to do foster economic development and this is evidenced by respondents mean score of 3.96, that construction of Dongo Kondu has increased fast movement of containers and other cargoes from the port and with a mean score of 3.82, respondents agreed that adequate berths for handling many ships at the port has led to higher performance in terms of achieving efficient loading and dis-charging of ships, accurate ship assignment at the terminal. The introduction of water front system at the port has also drastically reduced human intervention and dwell time, and is a key performance measure for operational efficiency of a terminal. This underlines the effect of infrastructure on performance of logistics management at Mombasa port, and, that lack of investments in infrastructure will clearly lead to additional externalities, namely congestion and under performance at the port.

Logistics Custom Clearance:

On the effect of custom clearance on performance of logistics management at the Mombasa port, the introduction and use of single window has significantly reduced congestions at the port by streamlining trade related procedure customs to ensure a smooth and efficient logistic delivery at the port. Efficient and effective use of port clearance systems as a result of better handling of storage machines, has not only reduced cost but has also enhanced the performance of logistic management at the port. The results shows that custom clearance and verification process is very fast and efficient due high investment and usage if information technology system (mean=3.36). Majority of the respondents agreed that custom clearance has been transformed very fast through use of online customer feedback mechanism and handlings of complaints, despite the process being complex, lengthy and cumbersome exercise. Among the interveners, KRA has been cited as one of the interveners that play a critical part in clearance of cargoes at the port with main focus on revenue collection.

Conclusion:

Information technology has enabled logistics has allowed key port operational areas to be automated and allowing logistics management to add value in the performance of the port. It has been established that logistics is a source of competitive advantage for many ports. Staff Competency plays a critical role in performance of logistics management and development of human resources through training and workshops empowers them to be effective and efficient in performing their work. This contributes substantially to performance of logistics management at the port.

Infrastructure, the development of infrastructure at container terminal has greatly minimized ships turnaround time and maximized terminal throughput. This is shown by improved port dwell time that has drastically reduced. The adequate berths and usage of automated machines and equipment has made it possible to handle many ship at the port at a reduced cost and delivery time leading to higher performance of logistics management. Custom clearance, it has been shown that the introduction of online systems and usage of single window system at the port has significantly transformed custom clearance and impacting positively on performance of logistics management. The study also concludes that all interveners should be equipped to minimize delay and increase revenue collections.

Recommendations:

1. The study recommends that for the performance of logistics management to be effective adequate investment in ICT to facilitate flow of information in response to ever changing customer tastes preferences is central to any business (Harisson & Hoell, 2013), and use of technology is essential to any business that wants to gain competitive advantage (Njambi & Katuse, 2013). The port should impress the use of technology in all of its operational areas including inland container depots.

2. Staff competency correlates with job performance and can be improved through training (Crawford, 2014), continuous involvement of staff in seminars and workshops to improve their competency should be encouraged and more important the retentions to skilled staff to maintain consistence in performance reduce cost of training staff. The organization should come up with a policy on the how well to guide the managers and implementers of these activities since they are the mirror into the business competition.
3. Infrastructure development for logistics activities through intermodal connectivity with the port (Notteboom & Rodrique, 2015) should be developed further inland to avoid congestion at the port. Due to changing trend in shipping industry towards large vessels, Kenya Ports Authority should continue dredging its navigational channels and areas in front of its berths.
4. The activities are significant and contribute positively by 0.353 for each unit spent on these activities. The study recommends more investment in this area. Like in the infrastructure, a policy should be put in place on what to be included in the infrastructure and the benefits be communicated to the stakeholders, including both the country and the citizens. Better

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