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Mutua, C. M., & Gichinga, L.

MBA Candidate, Jomo Kenyatta University of Agriculture and Technology [JKUAT], Kenya
Ph.D, Lecturer, Jomo Kenyatta University of Agriculture and Technology [JKUAT], Kenya

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ABSTRACT

The study sought to identify turnaround determinants influencing cargo vessels performance at Mombasa port and was guided by the following theories: Technology diffusion theory, Transaction cost theory and the goal setting theory. The study adopted a descriptive design and the target population was 404 respondents. A representative sample was selected using simple stratified random sampling since population of interest was not homogeneous. Primary data was collected using questionnaires while secondary data was collected from books and journals. The data collected was analyzed by use of descriptive and inferential statistics. The quantitative data generated was keyed in and analyzed by use of Statistical Package of Social Sciences (SPSS) to generate information which was presented using tables, charts, frequencies and percentages. The linear regression model was used to show the relationship between the dependent variable and the independent variables. The findings showed that the four independent variables have a significant effect on cargo vessel performance at Port of Mombasa. Integrated berth management system was found to have the strongest effect on cargo vessel performance. However, marine berthing structure showed the weakest positive relationship with cargo vessel performance. The study therefore recommended that IT Infrastructure is a necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing deep-sea container connectivity for economies heavily dependent on international trade.

Key Words: *Integrated Berth Management System, Cost Optimization Strategy, Berthing Structure, Integrated Clearance System and Performance*

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INTRODUCTION

Ports have traditionally evaluated their performance by comparing their actual and optimum measured in tonnage or number of containers handled. Port performance is said to have improved overtime if its actual throughput approaches its optimum throughput over time (Mangan, 2016). Ports add more value to shipments that are in the port area by further integrating themselves into value chains. Ports play a critical role in the effective and efficient management of product and information flow in the supply chain because these transport nodes are important and indispensable (Yeo, 2015). It is extremely important that port efficiency is at highest possible achievable level, speed of turnaround times, cost effectiveness & inland distribution capabilities are critically important.

According to Mangan and Cunningham (2014) it has been argued that improved port performance is partly due to revised handling procedures and focused management strategies as a result of private participation. According to Canadian Association of Logistics Management (2016), the Port of Rotterdam follows Singapore in port performance and efficiency ranking, with over six container terminals within its boundaries, all of which compete openly - thereby placing emphasis on service and ship turnaround times. Again the argument holds true for the port of Klang in Malaysia which is ranked second best worldwide where private participation is encouraged in areas of cargo handling and port administration thus enjoying greater service enhancements and ulti-mately drawing long-term sustainable business opportunities (Mangan & Cunningham, 2014)

In Africa, a key motivation for such projects has been a presumption that poor infrastructure and inefficient border control agencies are the major causes of extended delays in sub-Saharan Africa (SSA) ports. Based on new data and analysis, this note argues that collusion between controlling agencies, port authorities, private terminal operators, logistics operators, and large shippers is an important part of the problem. Decreasing dwell times in ports requires governments to combat collusive practices between the private sector and public authorities and recognize that large-scale investments in infrastructure are not sufficient to reduce logistics delay (Abe & Wilson, 2018). This empirically increased transport time dramatically reduces trade. In the years ahead, the significance of global logistics markets will continue to increase in response to economic and social conditions (DHL Logbook 2014). Improving logistics performance is at the core of the economic growth and competitiveness agenda. In Kenya that can be seen by efforts made by the transport ministry to come up with a seamless movement of cargo to and from the port of Mombasa and the development of the standard gauge rail (SGR), also the modernization and expansion of the Mombasa port as well as the LAPSET project.

The Port of Mombasa is a state corporation under the management of Kenya Ports Authority (KPA) who is also charged with the responsibility of managing all other ports along the Kenyan coastline (Kamau, 2014).

The current channel depth is sufficient to handle small and medium sized vessels with congestion normally occurring due to seasonal issues but has in the recent past been well anticipated and handled (Kombo and Tromp, 2016). Berthing is strictly on first come, documents ready basis with priority granted to Oil tankers, Containers ships, bulk carriers and other conventional ships in that order and in times of on-going and known humanitarian crises, priority berthing, labour and equipment is availed on “need be basis”(Kenya Shipping Council, 2016). In year (2016) the port handled a total throughput of 26.732million tons of cargo against 24.875million tons recorded in 2015, reflecting an increase of 7.5 per cent, Imports recorded a total of 22.676million tons of cargo in 2016 against 20.777million tons handled in 2015 an increase by 9.2 per cent (KPA, 2017). Exports recorded a total of 3.534million tons of cargo during the period under

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reviews up from 3.366 million tons registering an increase by 5.0 per cent (KPA, 2017).

Terminal area productivity which is similar to the quay productivity indicator is the measure of 'terminal area productivity' which applies to the entire terminal and expresses the ratio between terminal production and total terminal area for a given unit time; Equipment productivity is the value that is of interest is the number of container moves made per working hour, either for an individual machine or for the stock of a particular type of machine (Ruto, 2013). The simplest and most revealing measure of a terminal's efficiency is the cost of handling its container traffic or throughput over a specified period, Port dwell time which refers to the time cargo spends within the port or its extension (Kamau, 2014). Kamau (2014) observed that to separate the components of cargo delays, Dwell time figures have become a major commercial instrument to attract cargo and generate revenues. The average or mean dwell time has usually been the main target indicator in the best performing ports worldwide (Raballand *et al,* 2015).

Statement of Problem

Mombasa port is expected to handle growing imports and exports both containerized and loose cargo at allowable international vessel berthing and discharging timeframe. Container imports at the port have risen on average of 10 percent each year since 2005 despite relatively low GDP growth rates in 2015 to 2016 yet the port continues to suffers progressive declines in operational effectiveness in vessel berthing and discharging of the cargo, a failure that has caught the attention of international shipping lines operating at the port (KPA, 2017).

According to Kombo and Tromp (2008), the inefficiency in vessel berthing is sometimes occasioned by inefficiencies caused by the management of trucks loading and unloading goods, collection of custom duties, inspection, etc. Short-term immediate impact is an increased in vessel discharge delays, port congestion surcharges, and slower throughput of the port thus causing significant cargo delays and higher costs to importers (Drewry Consultants, 2017). Exporters have also experience increased costs because of possible unscheduled delays at the port thus disappointing customers who have based their own business decisions on fixed delivery schedules. The fact of the matter remains that, delaying the vessel discharge issues at the port of Mombasa acts as a brake on growing trade within the region (KPA, 2010).

The vessel berthing schedules and the related services at the Port have not been up to standard as the operations at the Port are way below the world class services of Durban port in South Africa, Shaghai in China and Hongkong Port in Hongkong (Drewry Consultants, 2017). A Survey conducted by the East African Logistics Performance(2018) reveals ongoing reforms and infrastructure improvements at the port of Mombasa have not yielded significant results as the port of Mombasa is still below the internationally acceptable standards of a maximum 3 days dwell time (East African Logistics Performance Survey, 2016). Delays in berthing has recently resulted to delay of four months to some of the containers prepared for the export market, as a result, buyers of Kenya's tea in Pakistan were opting for orders from Sri Lanka, India and Bangladesh (East African Logistics Performance Survey, 2016). Moreover, the ships meant to dock at Mombasa port are forced to by-pass the facility to dock at other ports due to vessel berthing, discharging and clearance inefficiencies (Sanga, 2018). Moreover, for the year 2018, the port has been battling legal petition on management between the Count Government and National government. The State also in 2018 suffered a major setback in a legal dispute in which three residents wanted the operations and management of the crucial areas of port be run by the county government (KPA, 2018). This negatively affected its performance because more emphasis was paid to fighting legal battles.

Apart from Kenya, Mombasa port is a critical nerve Centre for commerce in Africa, linking landlocked countries of Rwanda, Burundi, Uganda, DRC and Southern Sudan to the rest of the world. This means that every delay in vessel berthing and discharging quickly translates to a loss big enough to be felt across the entire Great Lakes region. The turnaround Strategy is a retrenchment strategy that involves backing out or retreating from the decision wrongly made earlier and transforming from a loss making company to a profit making company, it might be occasioned by continuous losses, poor management, Uncompetitive products and services and Wrong corporate strategies (John, 2017). The study therefore sought to identify turnaround strategies influencing cargo vessels performance at Mombasa port.

Objectives of the study

The general objective of this study was to identify turnaround determinants influencing cargo vessels performance at Mombasa port. The specific objectives were:-

- To examine the effect of integrated berth management system on cargo vessel performance at Port of Mombasa
- To establish the effect of cost optimization strategy on cargo vessel performance at Port of Mombasa
- To determine the effect of marine berthing structure on cargo vessel performance at Port of Mombasa
- To examine the effect of integrated clearance system on cargo vessel performance at Port of Mombasa

LITERATURE REVIEW

Theoretical Framework

Technology Diffusion Theory

Technology diffusion theory is the common lens through which theorists study the adoption and development of new ideas. Diffusion is defined basically as the process by which an innovation is adopted and gains acceptance by individuals or members of a community. Rogers (2010) noted diffusion comprises of four elements: Innovation- which is an idea, practices or object perceived as new by individuals or group of adopters; Communication channels - which is the means by which innovation moves from one individual to the next or group to group; Time- which is the non-spatial interval through which Diffusion event takes place. Rogers (2010) also came up with the perceived attributes theory that assumes that innovation bears the following characteristics; Relative advantage: Degree in which an advantage is perceived as better than the idea it supersedes. Compatibility: Degree that an innovation is seen to be consistent with existing values and norms, Complexity: The degree in which an innovation is seen to be difficult or easy to understand and use, Trial ability: is the degree in which an innovation may be experienced on a limited basis and Observability: The degree to which the results of innovation are visible to others. The easier it is for individuals to see results of an innovation, the more likely they are to adopt it. This theory relates to the first objective on integrated berth management system. Technology revolution has impacted on Sea Port, thus the drivers for change in vessel discharge must include the objectives of eradicating paper transactions to a secure system that facilitates seamless online transaction platform as an objective of a world class practice.

Transaction Cost Theory

Transaction cost (TC) has been the most utilized theory in minimizing operation cost. TC is perceived to provide the best decision making tools to help organizations to decide to outsource and to prepare themselves for forthcoming outsourcing arrangements function (Lysons & Farrington, 2012). The governance features of the theory influenced that it has been applied in studying the Managing relationship phase, whilst the concept of switching costs made the theory applicable in the reconsideration phase. Another useful issue for provided by TC is explanation of contractual complexity.

Though TC has not been utilized explicitly for studying the operation cost selection phase, its sub-theory, the theory of incomplete contracting, has been applied in studying the structure and contents of outsourcing and purchasing contracts and related preparation and contract management activities. Even though it has been exercised extensively in outsourcing applications, the TC has several indulgencies. Lysons and Farrington (2012) found that the original mapping to the TC framework only explained few IT sourcing decisions and generated much more anomalies in their sample.

The Goal Setting Theory

This theory suggests that the individual goals established by an employee play an important role in motivating him for superior performance. This is because the employees keep following their goals. If these goals are not achieved, they either improve their performance or modify the goals and make them more realistic. In case the performance improves it will result in achievement of the performance management system aims (Salaman, 2015). This theory is based on the hypothesis that individuals adjust their behavior in the organization on the basis of anticipated satisfaction of valued goals set by them. The individuals modify their behavior in such a way which is most likely to lead them to attain these goals. This theory underlies the concept of performance management as it is believed that performance is influenced by the expectations concerning future events (Salaman et al, 2015).

According to Mangan and Cunningham (2014), it has been argued that improved performance is partly due to revised handling procedures and focused management strategies as a result of private participation.

Conceptual Framework

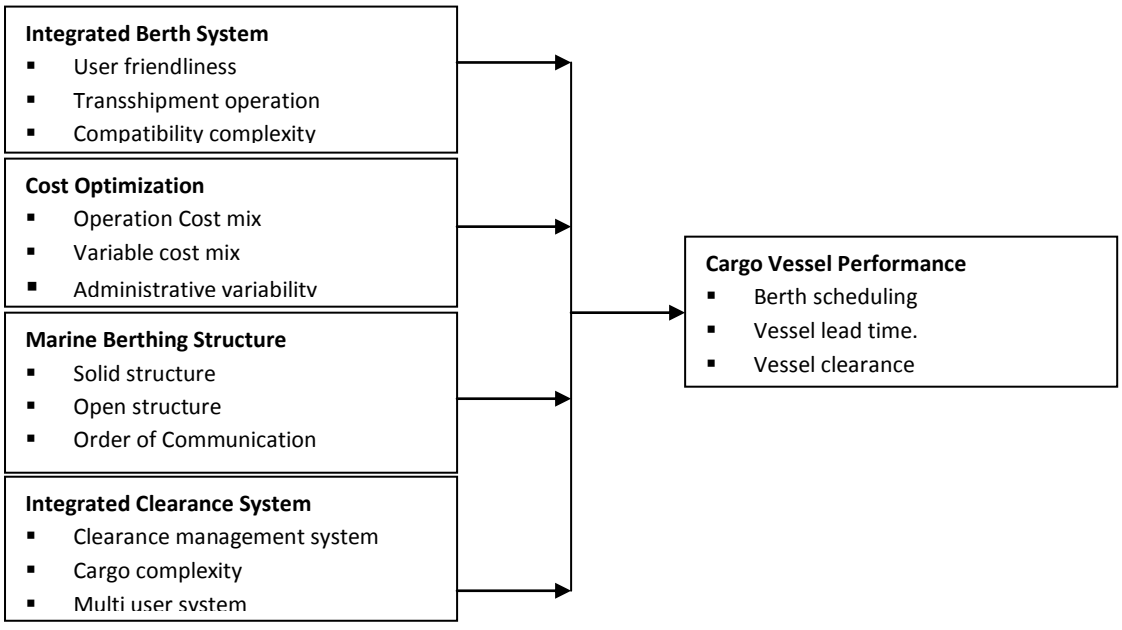

Figure 1: Conceptual Framework

Source: Author (2019)

Empirical Review

Empirical research has shown that by efficiently and effectively reacting to customers' demands timely, based on their needs as well as responding to their complaints, an organization is bound not only guard itself against loss of business but also, to get the goodwill from the other stakeholders thereby improving their productivity and service delivery

efficiencies which in turn help organizations leverage their operations and drive them towards becoming totally customer driven(Ndikom, 2017).

Alderton (2018) in his study of Port Management and Operations in Europe and Asia found out that the Asian ports performed slightly better in average that European ports because they acts as transshipment ports that helps in cutting down operation cost.

Raballand et al (2015), studied Slow steaming impacts on ocean carriers and shippers in Europe and found out that Maritime Economics and Logistics is the most essential success factor in port performance.

Suykens (2018) focused on Estimating the operational impact of container inspections at international ports, the study was interdependent since the cargo flow depends on the port choice of port users. However, more factors of ports determine the terminal throughput volumes.

Acciaro (2018) in his researched on maritime supply security found that shipment flow is dependent on geographical location of a port thus if the port is located on an easily accessible location by different modalities, more cargo is likely to flow to that specific port.

Conversely, some scholars like Bakshi and Bichou (2018) have identified factors influencing the Containerization, Logistic Cost and Facilitation by port users. The studies determine choice factors of different port users. These studies are relevant for this research since the choice of the port users determine the cargo flows to the ports.

The most discussed factors from these studies are, besides the location, the physical and technical infrastructure, the port efficiency, the hinterland connections, the port charges and the available (logistic) services. The physical and technical infrastructure includes port physical characteristics such as the depth of the water, the type of cranes in the port and the meters of quay.

METHODOLOGY

The study adopted a descriptive design because according to Burns and Bush (2016) the purpose of descriptive research is to determine and report the way things are. The sampling frame for the study was the list of the 411 employees based on human resource manual directory (KPA information and technology).

The sample size was 202 respondents selected using Slovin formula as below;

$$n = \frac{N}{1+Ne^2}$$

Where, N=Number of Population, e = degree of confidence (95%)

$$N = \frac{N}{1+Ne^2}$$

$$N = \frac{411}{1+411(0.05)^2}$$

= 202

A representative sample size was selected using Stratified random sampling. The study relied on data collected through Interviews for management and questionnaires for employees with both closed ended and open ended questions structured to meet the objectives of the study. The data was entered into the statistical package for social science (SPSS) version 21 and various analyses ran to establish the study objectives. Descriptive statistics were used in presenting the findings. Inferential statistical data was organized according to answers from the open ended questions in the questionnaire and analyzed through content analysis.

FINDINGS

The study targeted 411 employees of Kenya Ports Authority in Mombasa County, Kenya. From the study, 137 out of the 202 sample respondents filled-in and returned the questionnaires making a response rate of 67.7% as per Table below.

Descriptive Analysis of variables

Effect of integrated berth management system on cargo vessel performance at Port of Mombasa

Table 1: Mean and Standard Deviation on integrated berth management system

Statement	Mean	Std. Deviation
The system operation is fairly and understandable	3.86	0.966
The system is reliable and doesn't crash	3.32	1.187
The system makes it easy to locate tools and options	4.18	1.044
The system allows accurate prevention of illegal international transshipment login	3.78	1.068
The system supports war against smuggling at transshipment points	3.86	1.014
The system prevents intentional transshipment of grey market goods	3.26	1.176
The system can work efficiently with existing systems vessel berth systems	4.14	1.074
The system can be upgraded in future to work with other upcoming vessel berth systems	3.77	1.072
The system supports multiuser platform	3.78	1.068

From Table 1, respondents were required to answer integrated berth system related question. The system operation is fairly and understandable, respondents were in agreement as indicated by a mean of 3.86. In relation to the system was reliable and didn't crash respondents were in agreement as indicated by a mean of 3.32. In relation to whether the system made it easy to locate tools and options, the respondents were in agreement as indicated by a mean of 4.18. In relation to the statement on whether the system allowed accurate prevention of illegal international transshipment login, the respondents were in agreement as indicated by a mean of 3.78. In relation to the statement on the system supports war against smuggling at transshipment points, the respondents were in agreement as indicated by a mean of 3.86. In relation to the statement on the system prevents intentional transshipment of grey market goods, the respondents were in agreement as indicated by a mean of 3.26. In relation to the statement on whether the system can work efficiently with existing systems vessel berth systems, the respondents were in agreement as indicated by a mean of 4.14. In relation to the statement on whether the system can be upgraded in future to work with other upcoming vessel berth systems, the respondents were in agreement as indicated by a mean of 3.77. In relation to the statement on whether the system supports multiuser platform, the respondents were in agreement as indicated by a mean of 3.78. The standard deviation of the items was not the same indicating a dispersion of opinions. The overall mean for Organizational leadership was 3.8 (M = 3.8). These finding concurred with Fern(2016) who noted that one of the foremost planning problems in container transshipment operation concerns the allocation of home berth (preferred berthing location) to a set of vessels scheduled to call at the terminal on a weekly basis, he suggested use of advanced technology that integrates all berths for control purpose.

Effect of Cost optimization strategy on cargo vessel performance at Port of Mombasa

Table 2: Mean and Standard Deviation on Cost Optimization

Statement	Mean	Std. Deviation
Cost optimization mix can bring down direct cost	3.77	.996
Cost optimization mix can bring down direct labour	3.18	1.158

Cost optimization mix can bring down direct overheads	4.18	1.044
Vessel berth planned schedule experiences extreme variability	3.74	1.079
Vessel berth staffing schedule experiences some variability	3.86	1.014
Vessel berth planned schedule experiences extreme variability	3.38	1.246
The use of straddle carrier depends on berth activity levels	4.14	1.074
The use of stacker cranes depends on berth activity levels.	3.31	1.145
The use of gantry cranes depends on berth activity levels.	3.78	1.068

From Table 2, respondents were required to answer Cost optimization question. In relation to the statement on Cost optimization mix can bring down direct cost, respondents were in agreement as indicated by a mean of 3.77. In relation to whether Cost optimization mix could bring down direct labour, respondents were in agreement as indicated by a mean of 3.18. In relation to whether Cost optimization mix can bring down direct overheads, the respondents were in agreement as indicated by a mean of 4.18. In relation to the statement on whether Vessel berth planned schedule experiences extreme variability, the respondents were in agreement as indicated by a mean of 3.74. In relation to the statement on whether Vessel berth staffing schedule experiences some variability, the respondents were in agreement as indicated by a mean of 3.86. In relation to the statement on whether Vessel berth planned schedule experiences extreme variability, the respondents were in agreement as indicated by a mean of 3.38. In relation to the statement on whether the use of straddle carrier depends on berth activity levels, the respondents were in agreement as indicated by a mean of 4.14. In relation to the statement on the use of stacker cranes depends on berth activity levels, the respondents were in agreement as indicated by a mean of 3.31. In relation to the statement on whether the use of gantry cranes depends on berth activity levels, the respondents were in agreement as indicated by a mean of 3.78. The standard deviation of the items was not the same indicating a dispersion of opinions. The overall mean for Organizational Culture was 3.7 (M = 3.7). The finding concur with Ndikom (2017) who observed that due to increased port competition, port operators would have to optimize the cost of their operations if they must benchmark good productivity and performance for their terminals.

Effect of marine berthing structure on cargo vessel performance at Port of Mombasa

Table 3: Mean and Standard Deviation on Marine berth structure

Statement	Mean	Std. Deviation
Vertical structure enhances berth operations	4.34	.713
Vertical structures enhance flow of material	3.72	1.008
Vertical structure promotes timely discharge	3.89	.753
Open structure promotes information flow	4.12	1.341
Open structure promotes better discharge coordination	4.12	.839
Open structure promotes flexibility of vessel scheduling.	3.92	.816
Formal flow of communication promotes discharge efficiency	3.40	1.344
Proper information flow enhances timely berthing of vessels	3.85	1.121
Proper information flow enhances order in vessel discharge.	3.65	1.419

From Table 3, respondents were in agreement with the statements; Vertical structure enhances berth operations, Vertical structures enhance flow of material, Vertical structure promotes timely discharge, Open structure promotes information flow, Open structure promotes better discharge coordination, Open structure promotes flexibility of vessel scheduling, Formal flow of communication

promotes discharge efficiency, Proper information flow enhances timely berthing of vessels and Proper information flow enhances order in vessel discharge. This was supported by their respective means of 4.34, 3.72, 3.89, 4.12, 4.12, 3.92, 3.40, 3.85 and 3.65. With an overall mean of 3.9 (M = 3.9), the study finding concur with other major finding on the variable. For instance Mangan and Cunningham (2014) found that efficiency and performance of seaports are influenced by their berth structures and the styles adopted to manage them.

Effect of Integrated clearance system on cargo vessel performance at Port of Mombasa

Table 4: Mean and Standard Deviation on Integrated clearance system

Statement	Mean	Std. Deviation
Integrated berth system promotes timely berthing of vessels	3.17	1.145
Integrated berth system promotes timely clearance of vessels	3.06	1.200
Integrated berth system promotes timely release of vessels	4.15	1.299
The system breaks down complex cargo with ease for quick clearance and release	4.98	.816
The system can run a complex procedure aimed at enhancing discharge efficiency	3.25	1.199
The system is tailored to handle un anticipated complication arising from shipped cargo.	3.08	1.195
The system can handle large number of berthing vessels	4.20	1.325
The system can support large number of operations	4.13	.865
The system can work with stress without breakdown	4.36	.826

From the Table 4, respondents were in agreement with the statements; Integrated berth system promotes timely clearance of vessels, Integrated berth system promotes timely clearance of vessels, Integrated berth system promotes timely release of vessels, The system breaks down complex cargo with ease for quick clearance and release, The system can run a complex procedure aimed at enhancing discharge efficiency, The system was tailored to handle unanticipated complication arising from shipped cargo, The system can handle large number of berthing vessels, The system can support large number of operations, The system can work with stress without breakdown. This was supported by their respective means of 3.17,3 .06, 4.15, 4.98, 3.25, 3.08, 4.20,4.13 and 4.36. The opinions at the same time were highly dispersed as indicated by a standard deviation of 1.145, 1.200, 1.299, 1.199, 1.195 and 1.325. The study finding confirms the KPA (2018) report on migration resistance from Automated System for Customs Data (Asycuda) to intergrated clearance sytem despite all EAC member states, except Kenya, having been using the Integrated clearance Management System to exchange Customs declaration information with Asycuda.

Cargo Vessel Performance

Table 5: Mean and Standard Deviation on Cargo Vessel Performance

Statement	Mean	Std. Deviation
User friendly berth system enhances vessel performance.	3.96	.766
Good transshipment operation system ensures timely departure of vessel	3.82	1.187
System compatibility plays major role in vessel performance.	4.18	1.044
Proper operation cost mix promotes efficiency I vessel discharge	3.78	1.068
Well managed Administrative variability helps in achieving discharge efficiency	3.86	1.014
Proper variable cost administration enhances timely vessel performance	3.76	1.076
Solid structures aids in quick vessel performance	4.14	1.074
Open structures enhances free movement that enhances vessel performance	3.97	1.072
Multi user clearance system ensures timely release of vessel performance reports.	3.78	1.068

From the Table 5 above, respondents were in agreement with the statements; User friendly berth system enhances vessel performance, Good transshipment operation system ensures timely departure of vessel, System compatibility plays major role in vessel performance, Proper operation cost mix promotes efficiency I vessel discharge, Well managed Administrative variability helps in achieving discharge efficiency, Proper variable cost administration enhances timely vessel performance, Solid structures aids in quick vessel performance, Open structures enhances free movement that enhances vessel performance and Multi user clearance system ensures timely release of vessel performance reports.

This was supported by their respective means of 3.86, 3.32, 4.18, 3.78, 3.86, 3.26, 4.14, 3.77 and 3.78. Statements in the table also exhibit a high dispersion of 1.187, 1.044, 1.068, 1.014, 1.176, 1.074, 1.072 and 1.068. The variable had average mean of 3.9 (M=3.9). The high mean, meaning high concentration of opinion is in harmony with Alderton (2018) who researched on Port Management and Operations and found that port performance is a function of berth performance and cost monitoring and evaluation.

Regression Analysis

Table 6: Model Summary

Model	R	R^2	Adjusted R^2
1	0.879	0.773	0.758

In order to test the research hypotheses, a standard multiple regression analysis was conducted using cargo vessel performance as the dependent variable and the four determinant variables integrated berth management system, cost optimization strategy, marine berthing structure and Integrated clearance system as the predicting variables. The four independent variables that were studied explained only 75.8% turnaround determinants influencing cargo vessels performance at Mombasa port as represented by the adjusted R^2. This therefore meant that other factors not studied in this research contributed to 24.2% of turnaround determinants influencing cargo vessels performance at Mombasa port.

Table 7: Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2857.59	4	714.398	50.994	.000[b]
Residual	840.564	132	14.009		
Total	**3698.154**	**136**			

To determine whether there existed a linear relationship among the variables in the regression, the analysis of variance (ANOVA) output was examined. The analysis of variance reports how well the regression equation fits the data by studying the value of F – statistic and its corresponding significance. When the test was run at 0.05 significance level, the p value was 0.000. If p value (0.000) is less than α (0.05) then the result is significant. The regression model predicts dependent variable well as seen from Table 7 indicating that relationship was statistically significant (F = 50.994, p = .000). This meant that there was a 99 percent chance that the relationship between independent variables and dependent variable is not due to chance. This further supported the finding of correlation analysis that indicated existence of a positive relationship between turnaround determinants and cargo vessel performance at port of Mombasa.

Coefficient of Determination

Table 8: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	42.795	8.664		4.939	.000
	IBMS	.641	.114	.312	5.639	.000
	COS	.747	.102	.424	7.347	.000
	MBS	.690	.121	.321	5.685	.000
	ICS	.816	.160	.292	5.089	.000
a. Dependent Variable: Cargo vessel Performance						

a .Predictors: (Constant), IBMS, COS, MBS and ICS.

b. CVP.

The researcher conducted a multiple regression analysis so as to determine the relationship between Y and the four variables. As per the SPSS generated Table 8, the equation, $\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon}$ become:

$$Y= 42.795 + 0.641X_1+ 0.747X_2+ 0.690 X_3+ 0.816X_4$$

Where Y was the dependent variable Profitability), X_1 was Integrated berth management system, X_2 was cost optimization strategy, X3 was marine berthing structure and X_4 was Integrated clearance system.

According to the regression equation established, taking all factors into account (integrated berth management system, cost optimization strategy, marine berthing structure and Integrated clearance system) constant at zero, cargo vessel performance would be 42.795.The data findings analyzed also showed that taking all other independent variables at zero, a unit change in integrated berth management system would lead to a 0.641 change in cargo vessel performance; a unit change in cost optimization strategy would lead to a 0.747 change cargo vessel performance; a unit change in marine berthing structure would lead to a 0.690 change in cargo vessel performance; a unit change in Integrated clearance system would lead to a 0.816 change in cargo vessel performance.

Correlations

A correlation is a statistical measurement of the relationship either positive or negative between two variables. Possible correlations range from +1 to -1. A zero correlation is an indicator of no relationship between the variables of the study while a correlation of -1 indicates a perfect negative correlation meaning that as one variable goes up, the other goes down. A correlation of +1 indicates a perfect positive correlation, meaning both variables move in the same direction together.

Table 9: Correlations

Control Variables	IBMS	COS	MBS	ICS	CVP
IBMS	1				
COS	0.695	1			
MBS	0.373	0.228	1		
ICS	0.637	0.022	0.212	1	
CVP	0.836	0.421	0.208	0.224	1

From Table 9, the results generally indicated that the four variables were found to have a market Positive significant correlation on cargo vessel performance at 5% level of significance. There was a weak positive and significant correlation between MBS and CVP ($r =0.208$, $P < 0.05$). There was a weak

positive and significant correlation between ICS and CVP ($r = 0.224$, $P < 0.05$). There was a strong positive and highly significant correlation between IBMS and CVP ($r = 0.836$, $P < 0.05$). There was a moderately strong positive and highly significant correlation between COS and CVP ($r = 0.421$, $P < 0.05$). The results implied that IBMS and COS had significantly influenced cargo vessel performance. The findings concurred with the analysis of variance (ANOVA) that examined the value of F– statistic and its corresponding significance. When the test was run at 0.05 significance level, the p value was 0.000. If p value (0.000) is less than α (0.05) then the result is significant. The analysis indicated the coefficient of correlation, r equal to 0.695, 0.373, 0.637 and 0.836 for integrated berth management system, Cost optimization strategy, Marine berth system and integrated berth management system respectively. This indicated positive relationship between the independent variable namely integrated berth management system, Cost optimization strategy, Marine berth system and integrated berth management system.

CONCLUSIONS

Integrated berth management system is designed to assist the mooring master by providing comprehensive surveillance of mooring and vessel-related parameters during approach to the berth and while moored. Integrated berth management system sensors monitor speed of approach, mooring loads, weather conditions, oceanographic parameters and detect any drift off. All of these values are processed and presented on a control room display system which provides graphical representations and lists of all critical data, and is available in the harbour office and on ship. The Berth Management system integrates a number of sub-systems which were all available as stand-alone packages thus highly recommended for use in Mombasa port.

Thus the stiff competitions among port operators had increased the desire to attract port users. Therefore, port operators would have to optimize the cost of their operations if they must benchmark good productivity and performance for their terminals. There was no doubt that the maritime sector especially the port system is vital and instrumental to the national economic survival of the country. Kenya is a popular nation, renowned for her international nature of business, Quality customer service is the benchmark principle for the maritime professional and customer care techniques Therefore, the economic justification of a port is its ability to satisfy its customers at a lower price and also be able to make profits.

An organization's structure is a means to help management achieve its objectives and because objectives are derived from the organization's overall strategy based on existing structure, it's only logical that strategy and structure should be linked. From the study findings, it waas concluded that the efficiency and performance of seaports were influenced by their berth structures and the styles adopted to manage them, Consequently, it was postulated that effective seaport berth structure would considerably improve the efficiency and performance of their seaports which, in turn, would have positive effects on the nation's transport systems and the country as a whole.

From the study findings, it was concluded that Ports agencies, globally, were facing the emerging dilemma of continuously balancing demands to improve trade facilitation while at the same time meeting increasing needs for compliance. They were under pressure to deliver customer-focused services, collect accurate revenues and prevent unnecessary cost within the constraints of limited resources. These called for modernization of clearance system to deliver agility, accuracy, security, and transparency using systems that is empowering rather than restrictive.

RECOMMENDATIONS

IT Infrastructure is a necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing deep-sea container connectivity for economies heavily dependent on international trade. Logistics is an

optimization process of the location, movement and storage of resources from one point of origin, through various economic activities to the final consumer which can also be enhance through proper IT structure.

The economic justification of a port is its ability to satisfy its customers at a lower price and also be able to make profits. With regards to costs emanating from the vessel, it was affirmed that port costs, above all were the most significant, since they depended on the gross tonnage of the vessel and the time it spends in the port.

Some structure is necessary to make possible the effective performance of key activities and to support the efforts of staff. Structures provide the framework of an organization and its pattern of management. It is by means of structure that the purpose and work of the organization are carried out. If management makes a significant change in its organizations strategy, the structure would need to be modified to accommodate and support this change.

Ports agencies, globally, were facing the emerging dilemma of continuously balancing demands to improve trade facilitation while at the same time meeting increasing needs for compliance. It was for this reason that ports should implement the Integrated clearance Management System within their port.

Areas for Further Research

The current study was based on a limited sample and therefore the results could not be generalized to other parts of Kenya especially in the analytical terms. Further research done on a bigger scale with a large sample size could shed light turnaround determinants influencing cargo vessels performance at Mombasa port.

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