

Influence of Operational Strategies on Performance of Air Cargo Handling Projects at Jomo Kenyatta International Airport in Nairobi, Kenya

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Abstract: The study investigated the influence of operational strategies on performance of air cargo handling projects at Jomo Kenyatta international Airport. The study used a probability sampling technique in form of stratified random sampling to draw a sample of 97 respondents from the target population of 129 staff members of Swissport Kenya Limited. The study adopted a descriptive study to collect data from all the 97 respondents sampled using structured questionnaires. Data collected was analyzed using Quantitative data analysis techniques including descriptive and inferential statistics. Descriptive statistics such as frequencies and percentages formed the basis of the research. Inferential statistics included use of multiple linear regression model and bivariate correlation. Qualitative data was analyzed through content analysis and presented in continuous prose form. The study was governed by four theories: Multi-level theory; Agency theory; Project Performance and Contingency theory; and Goal-setting theory. The influence of operational Strategies on performance of air cargo handling projects was deduced from the results of the study. Study results established that all the operational Strategies showed a strong positive correlation to the performance of air cargo handling projects. The study established that quality management strategies, procurement management strategies, cost management strategies and risk management strategies influenced performance of air cargo handling projects at JKIA in that order of statistical significance. The study recommended that Swissport Kenya Limited company needed to establish an air cargo risk handling database; improve management of its air freight supply chain; maintain a comprehensive knowledge database of the markets in which it operates; and remove paper based verification of the documentation in favor of digital solutions.

Keywords: Cargo handling, Project Leadership Competencies, Project Cost, Project Quality, Project Management, Project Risk, Strategy, Variations, Procurement, Planning, Performance, WBS, Total Quality Management.

I. INTRODUCTION

The movement of goods, services and people is critical to the growth of any economy. Organizations are expected to first understand the needs of customers including which goods and services are essential. Once this has been realized then these goods and services need to be availed to the customers. This is where supply chain management comes into play. As a key component of supply chain management, logistics ensures that the distribution of the goods and services is actualized. Christopher (2011) defines logistics as, "...the process of strategically managing procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organisation and its marketing channels in such a way that the current and future profitability are maximized through the cost-effective fulfilment of

orders". Rushton, Croucher and Baker (2010) opine that logistics and supply chain are concerned with physical and information flows of raw materials through to the final distribution of the finished product. The concepts of supply chain management and logistics was examined in depth in this study. It should be noteworthy that given that these concepts are part of project management, this study examined the primary project management techniques employed by organisations to deal with logistical challenges in general and cargo handling. Air transportation is a very significant part of logistics. The very particular requirements associated with the air cargo business have led to the development of unique methods of operation in the world of logistics (Rushton *et al.*, 2010). The increasing level of competition in the industry has necessitated the need for the employment of business strategies that optimize the position of the players. Given the sheer scale of operations and the fact that many of these organizations are serving different market niches, they have different business segments which require business strategies that are applied from a project management standpoint.

The air transport industry is broken up into passenger and cargo sub-sections. Given that the former is more visible and politically essential, it tends to hog most of the attention of the consumers and authorities. In fact, the economic importance of the cargo industry is understood by a much smaller group of businesses and community leaders (Eclat Consulting, 2007). Kenya has two main international airports Jomo Kenyatta International Airport (JKIA) in Nairobi and Moi International Airport in Mombasa. There are other airports such as the Eldoret International Airport which has not really started taking international traffic; Kisumu, Malindi and Wilson airports (Alila, Khayesi, Odhiambo and Pedersen, 2005). There are many smaller airstrips which also serve domestic routes for small planes. Air freight transportation in Kenya has been developing steadily through the years with most of the airfreight concentrated at the JKIA - volumes increased from around 60-70,000 tons in the 1990s to 169,000 tons by 2002. Although the largest share of the airfreight consists of exports of flowers and fruits and vegetables, there is also a considerable volume of airfreight in high value manufactured products such as imports of spare parts (Alila, *et al.*, 2005). A regional comparison of international airfreight markets reveals that about 60-70% of the total airfreight goes to Europe. One of the key developments in the air transport industry in Kenya was the privatization of the national carrier – Kenya Airways in 1996, this was the first such privatization in Africa (Irandu, 2008). This privatization resulted in an increment of 90% in airfreight traffic from 12,115 tons in 1997/98 to 23,000 tons in 2001/2002. We also have Swissport Kenya Ltd as another Air Cargo handler in Kenya. Swissport operates a state-of-the-art cargo handling facility at Jomo Kenyatta International Airport comprising of 10'400 square metre(sqm) warehouse with 750 sqm cold room facilities. They handle roughly 76'000 tons of cargo per annum, 20% consisting of imports (mainly high-end consumer goods, pharmaceuticals etc.) and 80% being exports, predominantly perishables.

Airfreight transportation in Kenya mainly supports the country's agricultural sector through the export of horticultural products to international markets. (Irandu, 2008). Another significant development was the publication of the Civil Aviation Amendment Bill which established an autonomous Kenya Civil Aviation Authority in October 24, 2002 (Irandu, 2008). Swissport Kenya Limited is a subsidiary of Swissport International which was established in 1997 based on a self-handling organisation that comprised Swissair, Sabena and KLM. This organisation acquired a "Cargo Service Charter" in 2002 which was rebranded to Swissport Kenya Services Kenya, with the two entities eventually merging in 2014 to operate under the name Swissport Kenya Limited (Kanana, 2016). As a company, Swissport has been active in Kenya since 1997 and has managed to build a reputation as the largest ground handling company in Kenya by offering quality, reliability and value of money. This was officially confirmed with the award of various industrial certifications including ISAGO, ISO 9001, Cargo IQ and RA3 (Kanana, 2016). The company has a workforce of approximately 480 employees offering a number of services including ramp, passenger and baggage handling, cargo handling, flight operations, aviation security and lounge services to a majority of international airlines serving the JKIA. The cargo services comprise a state-of-the-art cargo handling facility at JKIA featuring a 10,400 square metre warehouse with 750 square metre cold room facilities which facilitate the handling of about 76,000 tonnes of cargo annually (20% of which are imports while 80% are exports) (Kanana, 2016). Kenya Airfreight Handling Limited (KAHL) is a subsidiary of the Kenya Airways Group along with Africa Cargo Handling Limited, Ken Cargo Airlines International Limited which was founded in 1977 after the disbandment of the East African community as a national carrier. Kenya Airways operates scheduled flights throughout Europe, Africa, Middle East and Asia with its hub at the JKIA in Nairobi.

Gichira (2007) explains that the national carrier is 29.8 % government owned and 16.73% KLM owned. The airline has been facing a number of challenges increasing globalization, local competition, higher operational costs amongst many others. This has prompted the company to introduce newer technology such as re-engineering of their

processes and reducing the size of their carriers. Additionally, the air cargo operations have been adjusted to incorporate more belly cargo rather than dedicated cargo planes to cut down on the costs of operation. The key segments of the economy that spur air cargo operations are horticultural exports, and imports of high value items such as gemstones (Waime, 2010). The nature of airfreight transportation is such that it deals primarily with high value or perishable commodities that require to be transported quickly over long distances; consequently, it behoves any country undertaking airfreight to engage in practices that will optimize its usage and ensure adherence to IATA Cargo Handling guidelines (Vega, 2014). It is at this point that project management techniques are employed to confer much needed optimization of air cargo handling protocols so as to improve air cargo operational performance. Air cargo handling is a complex endeavour that involves many different types of firms providing three core functions – physical carriage, forwarding and integration. Grosso and Shepherd (2010) describe these functions in a number of ways. There are Air Carriers which mainly move cargo from airport to airport and rely primarily of freight forwarders to deal directly with customers.

Freight forwarders which act as intermediaries between airlines and end-customers by contracting with airlines for carriage of goods and purchase of block space on their flights, consolidation of shipments for carriers, and delivery of goods to consignees through contracting with ground transportation services. Finally, integrated express carriers which include carriers such as FedEx and UPS which provide one entity with the different components of door-to-door services using multi-modal transport networks, ownership and operation of their own aircraft, surface transportation equipment, and automated handling and storage services (Refer to figure 1.1). The air cargo industry faces several challenges including differences between cargo and passenger characteristics; global economic slowdown; mode mix optimization and modal shift; geopolitical concerns; fuel prices; trade protectionism; and security compliance (IATA, 2015). Given unique characteristics of air cargo such as type and size of cargo and differences between cargo and passenger destinations, the use of dedicated freighters continues to be essential to the accomplishment of air cargo objectives. Secondly, financial constraints are reaching alarming levels with air cargo yields declining continuously. Customers are switching modes of transport to less expensive or perceived more environmentally friendly options such as rail or maritime transport. There are also geopolitical concerns regarding the volatility of oil prices and recent economic trends to onshore or closer-to-home manufacturing that are impacting the demand for air cargo transportation negatively. Many countries are also increasingly adopting trade protectionism which has been steadily restricting world trade and, thereby, reducing the demand for air cargo transportation. The issue of security and safety is assuming greater importance by the day with shipments facing air risks which delay shipping times, or may result in the prohibition of the transportation of certain goods by air. Technological interventions such as disruptive innovations have reduced air cargo volumes, for instance, 3D printing that has reduced the number of shipped parts and supplies. Crowd shipping services has connected people to want to ship something with travellers (IATA, 2015). Thus, it is imperative that air cargo handling companies determine the means through which they can combat these challenges to defend the industry and remain competitive.

II. METHODOLOGY

A descriptive study was used to obtain information about the status of operational strategies at Jomo Kenyatta International Airport in Kenya (Mugenda & Mugenda, 2003). The study focused on the investigation of the influence of project management strategies on the operational performance in air cargo handling. The study was conducted on a population of 129 staff members of Swissport Kenya Limited who included duty managers, team leaders and operational staff at the Nairobi premises to deduce their experiences in the implementation of project management strategies in air cargo handling in Kenya. All the 129 staff members were sampled to investigate the influence of risk management strategies, procurement management strategies, cost management strategies, and quality management strategies on the performance of air cargo handling projects at JKIA. The study used a probability sampling technique in form of stratified random sampling to draw a sample of 97 staffers of Swissport Kenya Limited from the target population of 129. Data was collected using closed-ended questionnaires consisting of questions that were accompanied by a list of all possible alternatives for the respondents to select an answer that best described their situation. Questionnaires were used to retrieve demographic information and the opinions of the 97 subjects about how the operational strategies influenced the performance of air cargo handling projects. Data collected from the respondents formed the primary data while secondary data was retrieved from journals, books and reports. Questionnaires were served to the respondents and later collected after their response. Questionnaires were categorized according to the respondents' demographic information and general information about the subject. The

International Journal of Novel Research in Engineering and Science

Vol. 4, Issue 2, pp: (42-53), Month: September 2017 - February 2018, Available at: www.noveltyjournals.com

study conducted a pilot study to test the structuring of the questions in the questionnaires to ascertain whether the questionnaire was reliable. 10 subjects were issued with questionnaires to test the reliability of the data collection instrument from the sample size of 97 staff members of Swissport Limited company (Mugenda & Mugenda, 2003). The 10 subjects participating in the pilot study were not included in the final study to avoid fatigue. The research instrument was validated by collecting and analyzing data to assess its accuracy. The study enhanced the construct validity of the questionnaires by using experts to examine the pilot test scores against established patterns of similar situations in the industry (Kimberlin and Winterstein, 2008). Inconsistencies were eliminated from the actual study by rephrasing the questions. For content validity, the researcher used the experts in air cargo handling such as the Operations Managers to screen the questions in the questionnaires for efficacy and relevance. Finally, the study enhanced criterion-related validity of the questionnaires by comparing with empirical findings from similar tests examining similar constructs for consistency. The research instrument was pre-tested to determine its reliability by checking the structure, wording and sequence of the questions. 10 questionnaires were piloted by issuing them to randomly selected respondents at Swissport Company limited Kenya. The questionnaires were coded and responses input into statistical program for social sciences (SPSS) version 20 which was used to generate the Cronbach's reliability coefficient.

Cronbach's Alpha (α) was used to measure internal consistency of the research instrument in this study. The study obtained a Cronbach's Alpha (α) coefficient of 0.883 against the 0.7 used as a threshold of reliability (Mugenda & Mugenda, 2003). In this study, data collected from the respondents was tabulated, coded and analyzed to deduce relationships between the variables using the statistical program for social sciences (SPSS) software version 20. Analyzed data was presented using tables, figures and charts (Mugenda & Mugenda, 2003). Frequency distribution tables and percentages were used in the study to capture the characteristics of the variables. The study employed inferential statistics such as multiple linear regression and bivariate correlation to analyze the relationship between the dependent variable and the independent variables. The independent variables in the study were: risk management strategies, procurement management strategies, cost management strategies, and quality management strategies while the dependent variable was performance of air cargo handling projects at JKIA. The study presented study results using frequency distribution tables, graphs and pie charts to deduce the relationship between the variables. Multiple linear regression was used to determine the relationship between the operational strategies: risk management strategies, procurement management strategies, cost management strategies, and quality management strategies and how they predicted the performance of air cargo handling projects at JKIA as explained by Swissport Kenya Limited. The multiple linear regression equation that was used in the model was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

Y= Project Performance

β_0 = Constant Term,

X_1 = Risk management strategies

X_2 = Procurement management strategies

X_3 = Cost management strategies

X_4 = Quality management strategies

In the model, β_0 = was the constant term while the coefficients $\beta_i = 1, \dots, 4$ were used to measure the sensitivity of the dependent variable (Y) to unit change in the predictor variables X_1, X_2, X_3 and X_4 . ε was the error term which was used to capture the unexplainable variations in the model.

III. FINDINGS

97 questionnaires were administered to the respondents out of which a total of 90 questionnaires were completed and returned. This translated to a response rate of 92.8%. According to Mugenda and Mugenda (2003), a response rate of 50% in social sciences is sufficient, therefore, in this study, a response rate of 92.8% is considered adequate. The study applied the use of Cronbach's Alpha to determine the internal consistency of the data to observe which whether certain items

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within a scale measured the construct under study. The study used an Alpha of 0.7 as per the guidelines of Heale and Twycross (2015). The study results are illustrated in the table 1 below. Accordingly, quality management strategies had the highest Alpha score of 0.907 indicating that it had the highest reliability; followed by risk management strategies with an Alpha score of 0.815; procurement management strategies with an Alpha score of 0.794 and lastly cost management strategies with an Alpha score of 0.702. This reflects the fact that all four variables passed the reliability test since they were above the 0.7 threshold. The combined reliability score of 0.883 which was also acceptable.

Table 1: Reliability of Test Results

Scale	Cronbach's Alpha	Number indicators	Comments
Risk Management Strategies	0.815	4	Acceptable
Procurement Management Strategies	0.794	4	Acceptable
Cost Management Strategies	0.702	4	Acceptable
Quality Management Strategies	0.907	4	Acceptable
Combined	0.883	16	Acceptable

Table 2 below, illustrates the multifactor correlation matrix from which the following observations can be made. The correlation values for all independent variables relative to the dependent variable show there exist a strong positive correlation which is acceptable as per the guidelines of Chee (2015). There exists a strong positive correlation of $r = 0.7654$ between project risk management and project performance. There exists a strong positive correlation of $r = 0.8942$ between project procurement management and project performance. There exists a strong positive correlation of $r = 0.7873$ between project cost management and project performance. Finally, there exist a strong positive correlation of $r = 0.9493$ between project quality management and project performance.

Table 2: Multi-Correlation Matrix

	Project Risk Management	Project Procurement Management	Project Cost Management	Project Quality Management	Project performance
Project Risk Management	1				
Project Procurement Management	.7775**	1			
Project Cost Management	.7511	.6013	1		
Project Quality Management	.5820	.7312	.8414	1	
Project performance	.7654**	.8942**	.7873**	.9493**	1

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3 below presents the regression statistics of the study variables as contained in the regression model summary. According to the table, the R Square value across all the four independent variables is 0.760. This implies that 76.0% of variations in project performance can be attributed to units of change by all the four independent variables. This agrees with Pallant (2001) who found that a good regression model should have R Square values that are above 0.7.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.842 ^a	.819	.760	.33413

a. Predictors: (Constant), Project Quality Management, Project Risk Management, Project Cost Management, Project Procurement Management

Table 4 below illustrates the ANOVA statistics for the variables of the study. Accordingly, the table shows that the calculated value of F (F_{cal}) as shown on the table of 8.224 is greater than the critical F-test score (F_{crit}) at 5% level of

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significance which is equivalent to 2.53 indicating that there is a significant relationship between all the independent variables and the dependent variable. Similarly, the p-value (or test of statistical significance – abbreviated as Sig.) is 0.026 which is lower than 0.05 indicating that there is a statistically significant relationship between all the independent variables and the dependent variable. This demonstrates a goodness of fit of the model.

Table 4: ANOVA Statistics

Model		Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
1	Regression	49.437	4	12.359	8.224	.026 ^b
	Residual	7.034	85	1.503		
	Total	56.471	89			

a. Dependent Variable: Project performance

b. Predictors: (Constant), Project Quality Management, Project Risk Management, Project Cost Management, Project Procurement Management

Table 5 shows the beta coefficients of the research data. The values of the constant and coefficients made it possible to generate the multiple regression model as follows:

Table 5: Beta Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.855	1.346		3.607	.001
	Risk Management	.364	.116	.277	.609	.888
	Procurement Management	.514	.246	.441	.331	.742
	Cost Management	.463	.101	.398	.613	.112
	Quality Management	.618	.101	.542	.596	.255

a. Dependent Variable: Project performance

The multiple linear regressions equation used in this model is:

$$Y = 4.855 + 0.618X_1 + 0.514X_2 + 0.463 X_3 + 0.364X_4 + 1.346$$

Where:

Y= Project Performance

In the model, $\beta_0 = 4.855$, is the constant term. The coefficients were calculated by SPSS version 20 and found to be: $\beta_1 = 0.618$, $\beta_2 = 0.514$, $\beta_3 = 0.463$ while $\beta_4 = 0.364$ and were used to measure the sensitivity of the dependent variable (Y) to unit change in the predictor variables X_1 , X_2 , X_3 and X_4 . ϵ was the error term and was found to be 1.346. The error term captured the unexplainable variations in the model. According to the study findings, a unit increase in project risk management will lead to 0.364 increase in project performance when all other independent variables (X_2 , X_3 , and X_4) are held constant. A unit increase in project procurement management will lead to a 0.514 increase in project performance when all independent variable (X_1 , X_3 and X_4) are held constant. A unit increase in project cost management will lead to a 0.463 increase in project performance when all other independent variables (X_1 , X_2 and X_4) are held constant. Finally, a unit increase in project quality management will lead to a 0.618 increase in project performance when all other independent variables (X_1 , X_2 and X_3) are held constant. The t-value measures the size of the difference relative to the variation in the data. The greater the magnitude of T (it can be either positive or negative), the greater the significance the difference.

The study found that the t-test scores for all the independent variables were 0.609, 0.331, 0.613 and 0.596 for project risk management, procurement management, cost management, and quality management, respectively. These figures indicate that data relating to the four variables is all significant.

IV. DISCUSSIONS

The study investigated the influence of risk management strategies on the performance of air cargo projects at JKIA. The study revealed that there exist clear procedures of risk management at Swissport Kenya. This indicates that the company has prioritised risk management since it had taken time to explain the procedures of risk management to all its staff. It also found that risk management at Swissport Kenya focuses on gaining control over project variations. This suggests that Swissport Kenya perform risk management to understand and manage variations between previous and current performance, or between projected and actual performance. Additionally, the study found that project characteristics are critical to the management of risks at Swissport Kenya. This indicates that each project at Swissport Kenya is unique and requires a customised assessment when determining the appropriate risk management strategy. Finally, the study found that contingency planning is a critical component of risk management at Swissport Kenya. This suggests that the company normally carries out contingency planning as a means of improving on the overall risk management effort. The study investigated the influence of procurement management strategies on the performance of cargo handling projects at JKIA. The study established that Swissport Kenya practices the five principles of procurement as part of its procurement management strategies. This indicates that the company is, not only familiar with the best practices of procurement but also implements them. The study established that procurement planning is a critical component of procurement management strategies at Swissport Kenya. This suggests that Swissport Kenya have incorporated procurement planning in their operations. The study established that Swissport Kenya practices conduct procurement as part of its procurement management strategies. This indicates that conduct procurement is one of the established procurement management strategies at Swissport Kenya. The study further established that Swissport Kenya practices control procurement as part of its procurement management strategies. This suggests that the organisation has institutes control procurement as one of its key procurement management strategies.

The study sought to investigate the influence of cost management strategies on the performance of air cargo handling projects at JKIA. According to the study results, Swissport Kenya employs the use of an Air Cargo Revenue management system to control costs. This indicates that Swissport Kenya has invested in the most advanced cost control technology in air cargo handling. The study established that overbookings were a feature of air cargo cost control at Swissport Kenya. This suggests that Swissport Kenya's cost management strategies included booking more cargo to offset no shows or cancellations. The study revealed the existence of a misalignment between the profit maximization objectives of airlines and that of cargo offload minimization of ground handling crew of Swissport Kenya. This indicates that the company's cost management strategy is compromised by the profit maximization objectives of the airlines that it services. The study found that Swissport Kenya Limited employs the use of Work Breakdown Structure based project cost management techniques such as CPM and PERT. This suggests that the company has incorporated the use of the best practice project management tools and techniques in controlling costs. The study investigated the influence of quality management strategies on the performance of air cargo handling projects at JKIA. The study found that Swissport Kenya employs the use of diagnostic control systems as part of project quality management. This indicates that the company has incorporated the latest technological advances to enhance their overall quality management effort. The study further found that the organisation employs the use of interactive control systems as part of project quality management. This suggests that the company has put in place the latest technology in project quality management. The study found that the company employs the use of TQM as part of project quality management. Given that TQM is one of the foremost quality management techniques, this suggests that the organisation has gone to great lengths to ensure appropriate project quality management. Finally, the study found that Swissport Kenya employs the use of boundary systems as part of project quality management. This further demonstrates the seriousness with which project quality management has been addressed at the organisation.

V. CONCLUSIONS

An assessment of the results from the inferential statistics reveals the following conclusions. Each of the independent variables contributes strongly towards the improvement of project performance of air cargo handling projects at JKIA. Quality management was established to be the most important factor in determining the performance of air cargo handling projects at JKIA. This factor is then followed by procurement management, cost management and risk management, respectively.

The most important strategies of risk management in air cargo projects at JKIA were found to be: the establishment of clear procedures for risk management; the control of variations between projected and actual performance; the

consideration of the characteristics of the project; and contingency planning. This indicates that these are the strongest indicators of the extent of the implementation of risk management in air cargo handling projects at JKIA. The implementation of procurement management in air cargo handling projects at JKIA is mostly indicated by the five principles of procurement: value for money, competition, transparency and accountability; procurement planning; conduct procurement; and control procurement.

VI. RECOMMENDATION AND SUGGESTIONS

Swissport Kenya, as one of the foremost air cargo handling companies at JKIA has managed to incorporate these into its procurement management strategies and, as such, amplified its impact of the overall performance of its projects. The study established a need for the organisation to engage with airlines to establish greater congruence in cost management to mitigate the impact of the misalignment of objectives. The focus should be on highlighting the synergies that will accrue to both parties through more consistent cost management strategies. The organisation can also improve its cost management by lobbying the Kenyan Government to revise some of its restrictive protectionist customs duties which lead to a reduction in the cost of imports and lead to a resultant decrease in the costs of air cargo handling as well. Although Swissport Kenya has maintained exceptional quality management standards, it can still improve through the removal of paper-based verification of transportation documents through the full digitalisation of information to ensure an even better freight experience for its customers. It can also incorporate the IATA's Smart Facilities initiative aimed at enhancing ground handling service quality through self-assessment and the incorporation of independent verification audit programmes. There has been little research done on specific air cargo handling operations in Kenya given that most of the research has focused on horticultural importation dynamics within the aviation industry. This should, therefore, be a priority area for future researchers and scholars. Most of the previous research has focused primarily on passenger aviation creating a gap and a need for research on air freight research. Thirdly, the technical aspects of air cargo operations in Africa, in general, and Kenya have been left mainly to regulators such as IATA and excluding empirical studies. This should be another priority for research.

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