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Factors influencing cargo agents choice of operations in Abuja airport, Nigeria

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ABSTRACT

The ability of an airport to attract traffic can vary within a multi-airport model of operation and highly competitive environment. This study is an effort to examine the factors that cargo agents rank as most important in their choice of Abuja airport cargo transhipment operations. A questionnaire survey was conducted on a random sample of members of the Association of Nigeria Customs Licensed Agents (ANCLA) at Abuja airport for primary data collection. The study employed a combination of Factor Analysis (FA) and Multiple Linear Regression (MLR) to analyse the data collected. The results of the factor loadings indicate airport capacity, airport charges and customs efficiency as the most significant factors that agents consider in their choice of handling cargo through Abuja airport. The three variables were found to have a high correlation relationship (R = 0.802) with the dependent variable of airport choice after subjecting it to regression analysis. This serves as information to airport managers for the airport planning of capacity in cargo operations within multi-airport country such as Nigeria.

1. Introduction

The role airports play in the flow and development of cargo traffic from location to location cannot be overemphasised. Cargo agents, shippers and airlines alike are so conscious of this that efforts are put in place individually to ensure business is transacted with utmost efficiency at airports. Air cargo transportation is designed as a system to provide fast and efficient delivery of goods. Air transport as the fastest mode of transport is used to safely carry high-valued and time-critical goods. It is necessary to note that air cargo has its own rules, and need to be studied separately from passenger transport as airports need to develop separate strategies concerning air cargo to make them more competitive in the market (Kupfer et al., 2012). Developments in the overall air transport operations lay importance to cargo operations at airports alongside passenger handling by the airlines. To show the importance of cargo operations by passenger airlines, Kupfer et al. (2012) stated that about half of air cargo is still transported in the belly space of passenger aircraft or in combi-aircraft and is therefore partly influenced by passenger transport, and that there are very important differences between air freight transported in all-cargo aircraft and in passenger aircraft. The view of Woodrow (2012) emphasised the growing percentage of cargo that will have to be transported in passenger bellies of most modern Airbus and Boeing twin-engine aircrafts; while smaller freighter operators are likely to increasingly focus on optimising their belly space for cargo operations. The study of Merkert and Ploix (2014) further established the influence of passenger terminal reorganisation on belly-hold freight operations at airports.

Airports as terminal points in the transport system compete for traffic in multi-airport country such as Nigeria. Ohashi et al. (2005) detailed out airport choice factors for cargo transshipment in the North/East Asia region. The choice arises basically as a result of competition among airports. This possibly will make cargo agents prefer routing operations in one airport at the expense of the other even when the other airport is not close to the final destination of the cargo. Nevertheless, the ability of an airport to attract cargo routing by agents where there are alternative airports to satisfy their cargo delivery purpose needs to be studied extensively. The competition for cargo traffic handling and its connection to the airport choice of cargo agents operations is the focus of this study. The study of Gardiner (2006) found the location and presence of freight forwarders (cargo agents) as part of airport characteristics identified to be attracting cargo airlines to an airport. This underscores the importance of cargo agents operations at any airport. To this end, this study is an effort to find out why cargo agents prefer to operate at an airport at the expense of the other with

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competitive traffic demand.

The paper is structured such that Section 1 handles the introduction; Section 2 is a focus on literature, while Section 3 described the study area; Section 4 gives the details of data and methods adopted for the study while Section 5 deals with the presentation of results and discussion; and Section 6 presents the policy recommendation and conclusion.

2. Literature

A search for literature on Nigeria air cargo traffic revealed that much attention had not been given to this aspect of air transportation. While the analysis of the flow of passenger, aircraft movement (Afolayan et al., 2012a,b), airline services (Adeniyi and Olufemi 2011), airline choice of passengers (Ukpere et al., 2012); issues of policy and bilateral agreements (Danjuma et al., 2014); air transport demand (Aderamo, 2010); and airport development (Aun, 2013) had received much attention by scholars. The air cargo sub sector of the Nigeria aviation industry seems to have been neglected. This can be translated that researchers in the Nigerian aviation sector have been overlooking the issues relating to the choice of airport in cargo flow. This is in line with the statement of Kupfer et al. (2012) in their study on airport choice of freighter operations that airport competition is a topic which recently gained interest in air transport research, and that research about airport competition for air cargo is still scarce. Meanwhile, the issues regarding airport choice of cargo agents operations play important roles in the ability of an airport to develop in a competitive aviation market. In such market, agents tend to route cargoes through a particular airport at the expense of others, even when the other airport(s) is closer to the final destination of the cargo. This study, therefore, examines the factors informing the choice of cargo agents for operating in Abuja airport with a view to examining the explanatory factors that cargo agents considered most important in their choice of operations at the airport.

3. Study area

There are four major international airports in Nigeria that are strategically located to serve as regional airport hubs for traffic. These airports are located in Lagos and Port Harcourt serving as hubs for traffic in the southern part of Nigeria, and Abuja and Kano serving as hubs for traffic in the northern part. There also exist other airports located around the major international airports (See Fig. 1). This indicates the multi airports system of operation in Nigeria. These airports have the capacity to compete among themselves in the handling of cargo traffic. The choice of air cargo operations at any of the airports is basically on their consideration of some choice factors which might lead to concentration of operations at one airport at the expense of the other.

It is suggestive that the major international airports with customs facilities will compete for traffic destined for various locations within their geographical zones. To this end, while Abuja and Kano airports compete in the North, Lagos and Port Harcourt airports may compete in the South. Cargoes are handled at airports by the Nigerian Aviation Handling Company (NAHCo Aviance), which serves as a major cargo handler in Nigeria with offices located in all the major international airports. The company handles more than 70 per cent of cargo carrying airlines operating in Nigeria (www.nahcoaviance.com). The remaining 30 per cent are handled by Skypower Aviation Handling Company Limited (SAHCOL). NAHCo handles all airlines operating dedicated freighter and cargo belly operations in the country. The total volume of cargo handled by NAHCo at Abuja and Kano airports from 2006 to 2015 is presented in Fig. 2.

Fig. 2 is presented to show the importance of cargo traffic at the airports as well as the tendency for competition between Abuja and Kano airports in the handling of cargo traffic over the years. For a period of ten (10) years, Abuja handled a total of 36,502,523 tons of cargo which is closely competed with 34,943,472 tons handled at the Kano airport over the same period. This indicates the airports handled an average of 3.6million and 3.4million tons of cargo on annual basis respectively.

Abuja airport been the airport of the study was named Nnamdi Azikwe International Airport after the first Governor General and president of Nigeria. The airport serves both international and domestic traffic. The airport is located some 40 km from Abuja City Centre on the main road from Abuja City to Gwagwalada.

4. Data and methods

The study relied on primary sources of data collection involving the survey of cargo agents who are registered members of the Association of Nigerian Licensed Custom Agents (ANLCA), Abuja chapter through questionnaire administration. The study took a census of the agents where 112 of the potential 130 representing 86% responded to questions to form the sample size for the study. The survey took place in May 2013 successfully. The sample size of the study is said to be adequate according to the suggestion of Hair et al. (1995) referred to in Williams et al. (2010) that sample sizes should be 100 or greater. The study employed simple random sampling technique to collect data with the support of the branch Chairman and two research assistants. The sampling technique is to ensure that agents were surveyed with equal chance of probability. Information in the questionnaire was presented such that cargo agents will have to indicate the weight they attached to a multiple of factors that is capable of influencing their choice of operating at Abuja airport.

The instrument was designed on a multiple-item measurement scale fashioned on the 5-point Likert scale to allow for a wide measurement of the degree of the agents' consideration of the each factor presented in the questionnaire. The choice factors measured are ten (10), and are extracted and modified from the literature on airport choice factors (Gardiner et al., 2005; Ohashi et al., 2005; Ozoka, 2009; Kupfer et al., 2012; Ubogu, 2013). These items include airport capacity, cargo security, and airline flight route, cargo handling equipment, airport infrastructure, airport-airport interconnection, airport service quality, customs efficiency, airport charges and airline flight frequency. Some variables such as accessibility, location and access time were not considered because they seem to be more significant in the choice of airports by passengers. The variables were tabulated for the agents to rank in order of significance from 1—Not Significant to 5—Highly Significant as each influences the agents' choice of operating at Abuja airport.

Factor and multiple linear regression analyses were employed as techniques for data analysis. This is in the light of the need to reduce the variables to a few orthogonal ones that could be used to explain the major factors that determine cargo agents' preference and usage of Abuja airport. At the same time, further measurement of the extent of the influence of the few variables on airport choice is seen to be essential. The factor analysis is to highlight the three most significant factors of airport choice for cargo agent operations, while the multiple linear regression analysis was chosen with a single purpose of evaluating the extent of the relationship between the three most significant factors (identified by factor analysis) serving as independent variables and airport choice (Abuja airport) serving as the dependent variable. The main purpose of the factor analysis is to determine the number of common factors needed that can adequately describe the correlations between the observed variables, and estimating how each factor is related to each

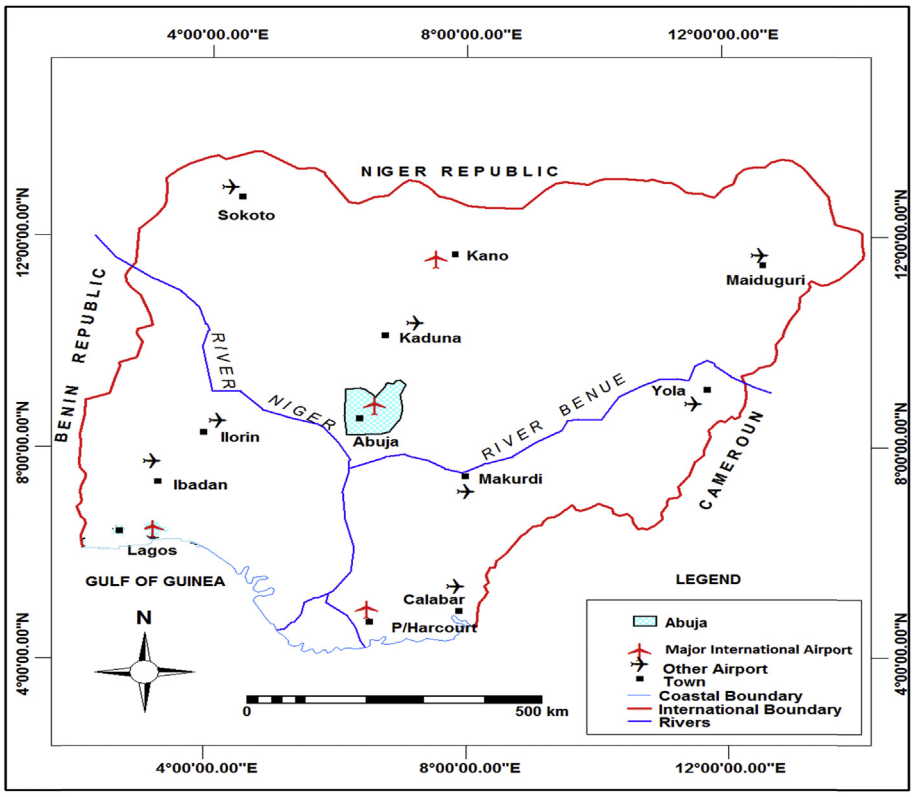
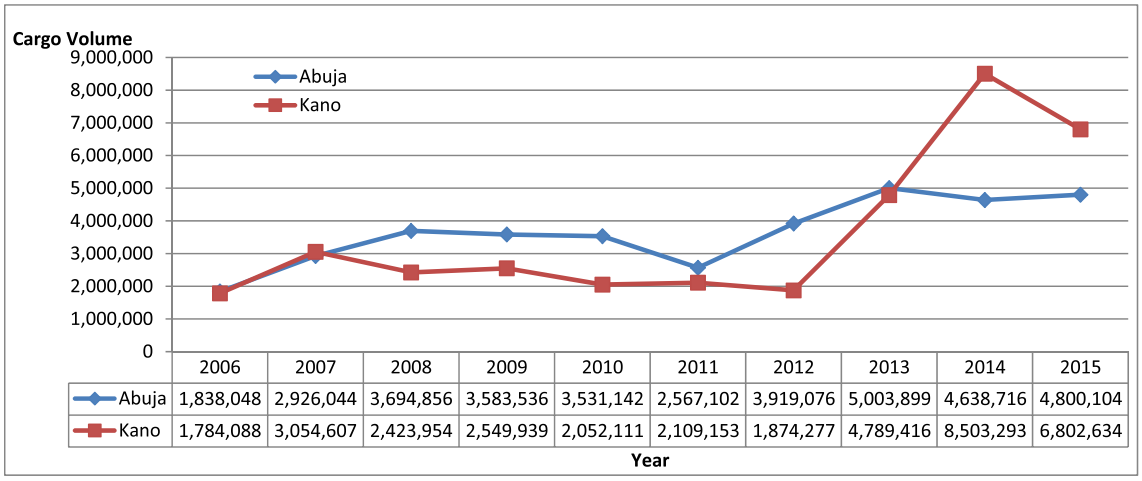


Fig. 1. Location of major airports in Nigeria.
(Source: Adapted and modified from airport map of Nigeria, Google Earth.)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Abuja	1,838,048	2,926,044	3,694,856	3,583,536	3,531,142	2,567,102	3,919,076	5,003,899	4,638,716	4,800,104
Kano	1,784,088	3,054,607	2,423,954	2,549,939	2,052,111	2,109,153	1,874,277	4,789,416	8,503,293	6,802,634

Fig. 2. Total volume of cargo (in tons) handled at Abuja and Kano airports 2006–2015.
(Source: NAHCo annual reports 2006–2015.)

observed variable by estimating the factor loading (Oyesiku, 2000). This study adopted the notation for factor analysis presented by Laudau and Everitt (2004) and used by Ubogu (2013) as a model for mathematical specification;

$$\begin{aligned}\chi_1 &= \lambda_{11}f_1 + \lambda_{12}f_2 \ldots + \lambda_{1k}f_k + u_1\\ \chi_2 &= \lambda_{21}f_1 + \lambda_{22}f_2 \ldots + \lambda_{2k}f_k + u_2\\ &\vdots\\ \chi_q &= \lambda_{q1}f_1 + \lambda_{q1}f_2 \ldots + \lambda_{qk}f_k + u_q\end{aligned} \quad (1)$$

The equations above can be re-written as:

$$\chi = \Lambda f + u, \quad (2)$$

Where,

$$\chi = \begin{bmatrix} x_1 \\ \vdots \\ xq \end{bmatrix}, \ \Lambda = \begin{bmatrix} xu \ldots \lambda_{1k} \\ \vdots \\ \lambda q_1 \ldots \lambda qk \end{bmatrix}, \ f = \begin{bmatrix} f \\ \vdots \\ fk \end{bmatrix} \text{ and } u = \begin{bmatrix} u_1 \\ \vdots \\ uq \end{bmatrix} \quad (3)$$

A major component of the output of Factor Analysis is the communalities estimates of the variables. This includes

communalities estimates of the variables, which indicates the amount of variance in each variable that is accounted for. Communalities estimates give the initial and extracted values of the variance in each variable accounted for by the factors in the factor solution. For this study, values lesser than 0.400 at extraction are said to be small, and indicate variables that do not fit well with the factor solution, and should possibly be dropped from the analysis. The estimates of communalities are computed by taking the sum of the squared loadings for each variable. The model can be represented as;

$$H_i = \sum_{j-i}^{n} P_{ij}^2 \quad (4)$$

where P is the factor loadings of the variables.

In the case of multiple linear regression analysis, Laudau and Everitt (2004) stated it is a method of analysis for assessing the strength of the relationship between each of a set of explanatory variables (sometimes known as independent variables), and a single response (or dependent) variable. The model specification to measure the extent of the relationship between the dependent variable and the independent variables takes the general form:

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \quad (5)$$

where; Y = Dependent Variable (Airport Choice); β_1, β_2, β_3 = Coefficients; and a = Constant, while X_1, X_2, X_3 are the independent variables.

5. Results and discussion

The multi airport system of operation in a country such as Nigeria has the inclination to encourage competition among airports. The consequence is reflected in the choice of users' preference of one airport or the other. It is normal that a data set to be used in statistics of this nature pass a test of suitability and adequacy. Thus, to assess the suitability of the data, internal consistency checks were conducted using Kaiser-Meyer-Olkin (KMO) measure of sample adequacy and the Bartlett test of sphericity (See Table 1). These tests are employed based on the requirement of factor analysis prior to factor extraction as suggested by Williams et al. (2010). The importance of the tests is to see if the samples were adequate to meet the assumptions of the use of factor analysis.

The result in Table 1 shows a sampling adequacy value of 82.6% and significant at $p < 0.01$, which indicates that the data obtained is adequate and suitable for the analysis. This is according to Cornish (2007) statement that a KMO result should be over 70% to be sufficiently correlated. Therefore, with a value above this threshold, the data are considered to be reliable for the use of factor analysis.

The factors informing the choice of cargo agents operating at Abuja airport are naturally dependent on one another by a degree of relationship that cargo agents attached to them. The correlation matrix (Table 2) of the variables under investigation reveals the nature of the relationship between the variables subjected to investigation in this study. It is observed that the correlation between all the variables shows a positive relationship. This implies that any effect on one factor will produce a corresponding measure of effect on the other. For ease of table presentation, the variables are represented by AIC, CS, AFR, CHE, AI, AAI, SQ, CE, ACH, and FF where AIC = Airport Capacity, CS = Cargo Security, AFR = Airline Flight Route, CHE = Cargo Handling Equipment, AI = Airport Infrastructure, AAI = Airport-Airport Interconnection, SQ = Service Quality, CE = Customs Efficiency, ACH = Airport Charges and FF = Flight Frequency.

The result presented in Table 2 indicates the strongest correlated pair of variables are cargo security and airport service quality (r = 0.673). This is obvious in that better airport service quality will tend to enhance security level of the airport. Conversely, high level of cargo security can translate into quality service delivery at any airport. This is because airports that are characterized by poor level of cargo security will be perceived to be delivering low service quality. This implies that cargo agents will prefer to operate at an airport where cargoes are provided with maximum security that ensures transhipment/cargo handling without damages. Airport charges were also found to be strongly correlated with customs efficiency (r = 0.641). Indeed, customs efficiency has a close relationship with airport charges because customs are traditionally functions at airports to charge and collect tariff on behalf of the government. Therefore, airport with lower charges and efficient customs operations will probably attract the choice of cargo agents' operations. This is related to the study of Berechman and De Wit (1996) which found that airport charges had an influence on the passenger airlines' location decision.

Similarly, airport infrastructure showed a strong correlation with airport capacity with an r value of 0.621. In fact, this result clearly implies that the capacity of an airport is dependent on the level of infrastructure provided. The quality and condition of airport infrastructure will determine the type of aircraft it can handle, and the types and quantity of cargo it can process. It implies that airports with improved infrastructure provision will have the capacity to handle large cargo traffic that is capable of influencing the choice of cargo agent operations. Another pair of variables that are strongly correlated is customs efficiency and service quality at the airport (r = 0.602). This can serve as an extension of the relationship between customs service and the overall airport charges in cargo operations at an airport. It implies improvement in the efficiency of customs services at an airport perhaps lead to an increase in the overall service delivery in cargo transshipment that may influence the choice of cargo agent operations. This is true of the operations of electronic data interchange which helps in quick clearing of cargoes at the airport that is geared towards efficient service delivery. Another significant relationship with r value of 0.602 exists between airport charges and airline flight frequency. This indicates that reduced airport charges may encourage increased aircraft movement with resultant increase in cargo traffic at the airport.

The results of the analysis in Table 3 showing the communalities estimates of the variables after extraction indicate that very little of the variance of the item "airport-airport interconnection" (with 18.6%) can be attributed to the three common factors that are influencing the choice of cargo agents operating in Abuja airport.

Table 1
KMO and Bartlett's test of sampling.

Kaiser-Meyer-Olkin measure of sampling adequacy.		0.826
Bartlett's test of sphericity	Approx. Chi-square	535.651
	Df	45
	Sig.	0.000

(Source: Author's computation.)

Table 2
Correlation matrix of factors influencing the choice of air cargo operations at Abuja airport.

	AIC	CS	AFR	CHE	AI	AAI	SQ	CE	ACH	FF
AIC	1.000									
CS	0.452	1.000								
AFR	0.496	0.470	1.000							
CHE	0.437	0.526	0.423	1.000						
AI	0.621	0.555	0.404	0.509	1.000					
AAI	0.304	0.365	0.346	0.127	0.289	1.000				
SQ	0.449	0.673	0.446	0.478	0.639	0.415	1.000			
CE	0.188	0.552	0.337	0.380	0.339	0.245	0.602	1.000		
ACH	0.033	0.260	0.280	0.326	0.214	0.179	0.399	0.641	1.000	
FF	0.283	0.338	0.485	0.334	0.415	0.254	0.519	0.434	0.602	1.000

(Source: Author's computation.)

Table 3
Communalities of airport choice for cargo agents operation in Abuja.

	Initial	Extraction
Airport capacity	0.505	0.651
Cargo security	0.591	0.715
Airline flight route	0.439	0.451
Cargo handling equipment	0.427	0.387
Airport infrastructure	0.580	0.601
Airport-airport interconnection	0.248	0.186
Service quality	0.662	0.700
Customs efficiency	0.609	0.714
Airport charges	0.599	0.781
Flight frequency	0.534	0.657

Extraction method: principal axis factoring.
(Source: Author's computation.)

Also, the variances of the items 'cargo handling equipment' and 'airlines flight route' with 38.7% and 45.1%, respectively will have little to attribute to the common factors. However, the other variables with extracted values greater than 50.0% shows percentage variances that are high, and suggest the variables can be attributed to the three common factors.

Furthermore, the total variance of the airport choice factors presented in Table 4 indicates that the percentage of the total variance accounted for by the factor analysis shows two factors with eigenvalues greater than 1. The percentage of total variance explained indicates that factor one has an eigenvalue of 4.694 accounting for 46.94% of the total variance explained by the analysis. Similarly, factor two reveals an eigenvalue of 1.395 thereby accounting for 13.95%. The significance of these factor loadings provides a clear indication of the underlining dimensions of the choice variables that have been reduced to two major factors with eigenvalues greater than 1.00. These are the dominant loadings for each factor. These eigenvalues are the proportion of the total variation in the data set that is explained or at best summarized by a factor.

The cumulative percentage of the variance revealed that the two factors alone account for 60.9%, which indicates the proportion of the total variation that is explained by these two factors. Meanwhile, the third factor accounts for a very small proportion of the total variation of the explained variance of 9.1% (See Table 4).

According to Laudau and Everitt (2004), an attempt must be made to identify the variables that can be used to explain the underlining dimensions of the issue under consideration. However, the communality table alone cannot be relied upon to identify the factors that explain the choice of cargo agents operations in Abuja airport, therefore, some method of factor rotation (varimax) is employed. The purpose is to maximize the variance of the squared loadings to produce orthogonal factors with a view to interpreting the factor analysis. In practice, an arbitrary threshold value of 0.4 is equated as high loadings while the factor loadings are reordered according to size (Laudau and Everitt, 2004).

Table 5 shows the rotated factor matrix of the explanatory variables. It can be observed from the Table that the variable airport-airport interconnection does not load on any of the major three factors extracted to be influencing cargo agents' choice of operating in Abuja airport, Nigeria. This indicates that the variable is not important in the discussion of the factors influencing the choice of cargo agent operations at the airport. It also implies that the choice of agents operations in Abuja airport do not depend on the extent of the direct connection(s) the airport is having with other airports at regional and/or global level. As a matter of fact, the airport seems not to have established and sustained connection(s) with other airports that will guarantee constant flow of cargo to/from the airport to influence cargo agents' choice of operations. The issue with airport-airport interconnection simply implies a

Table 4
Total variance of Abuja airport choice of cargo agents operations explained.

Factor	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	4.694	46.943	46.943	4.307	43.070	43.070
2	1.395	13.951	60.894	1.095	10.945	54.015
3	0.906	9.055	69.949	0.441	4.414	58.430
4	0.789	7.886	77.835			
5	0.589	5.891	83.726			
6	0.475	4.746	88.473			
7	0.403	4.029	92.502			
8	0.284	2.845	95.347			
9	0.264	2.643	97.990			
10	0.201	2.010	100.000			

Extraction method: principal axis factoring.
(Source: Author's computation.)

Table 5
Rotated factor matrix[a] of cargo agents' choice of operations Abuja at airport.

	Factor		
	1	2	3
Airport capacity	0.802		
Airport infrastructure	0.705		
Airline flight route	0.580		
Cargo handling equipment	0.486		
Airport-airport connection			
Airport charges		0.830	
Flight frequency	0.401	0.700	
Customs efficiency		0.500	0.668
Cargo security	0.534		0.648
Service quality	0.546		0.553

Extraction method: principal axis factoring.
Rotation method: varimax with Kaiser normalization.
[a] Rotation converged in 5 iterations.
(Source: Author's computation.)

representation of the concept of hub and spoke operations between airports.

A further careful examination of Table 5 shows the variable with highest loading factor for each of the extracted factors. For instance, airport capacity loads with 80.2% on Factor 1, airport charges, loads by 83.0% on Factor 2 while Factor 3 has customs efficiency with 66.8% loading. These are found to be the most important factors that explain the choice of cargo agents operations at the airport. In terms of operations, airport capacity is generally expressed by the maximum number of units of demand that can be accommodated at an airport during a given period and under given conditions.

For customs efficiency to have the highest loading value on Factor 3 emphasises that customs operations at airports is a factor that influence choice of airport usage for both passenger and cargo traffic. This is in relation to the statement of Zhang and Zhang (2002) that any customs administration that can provide reliable, timely clearance, or immediate release based on pre-clearance, creates a competitive advantage for the relevant airport.

The study took a step further in the analysis of the choice factors for cargo agents operations at Abuja airport by subjecting the three most significant factors identified to multiple linear regression analysis. These factors are airport capacity, airport charges and customs efficiency, serving as independent variables with cargo agents' airport choice as the dependent variable.

The coefficient of airport choice for cargo agents operations presented in Table 6 provides the estimates of the regression coefficient, standard errors of the estimates, *t*-tests that a coefficient takes the value zero, and confidence intervals. The estimated coefficients are given under the heading 'Unstandardized Coefficients B'; these give, for each of the explanatory variables, the predicted change in the dependent variable when each explanatory variable is increased by one unit conditional upon all the other variables in the model remaining constant. It therefore shows that the choice for cargo agents operation in Abuja airport tends to be increasing by 8%, 8.2% and 14.7% for every additional score on airport capacity, airport charges and customs efficiency respectively (See Table 6). This implies that the three variables are the major factors influencing the choice of cargo agents operating in Abuja airport. The fact that the extent of the influence of customs efficiency as a factor in the choice for cargo agents operation at Abuja airport almost doubles the total percentage of the influence of airport charges and airport capacity is significant.

The VIF statistics determines the level of multicollinearity in the analysis. The VIF value of 1.051 for airport capacity indicates there is no multicollinearity in the variable. The VIF for the other variables (customs efficiency-1.783; airport charges-1.721) indicates some correlations, which are not enough to be excessively concerned about in the build-up of the model.

Table 7 represents an ANOVA result providing an F-Test equal to 67.091 when the explanatory variables are set at zero. The result shows $F(3,112) = 67$, $p < 0.001$, which can bring to a conclusion that the independent variables (customs efficiency, airport capacity and airport charges) significantly influence cargo agents choice of operations in Abuja airport.

Table 8 presents the model summary of the multiple linear regression analysis in order to assess the strength of the relationship between the independent variables and the dependent variable. It further shows the model correlation coefficients, R, its square, R^2, and an adjusted version of this coefficient as summary measures of model fit. The multiple correlation coefficient $R = 0.802$ predicts there is a strong correlation in the relationships between and within the independent variables of customs efficiency, airport capacity and airport charges, and the dependent variable of cargo agents airport choice.

The R^2 value showing 0.642 indicates that the variables can explain 64.2% of the variance in the airport choice factors influencing the operations of cargo agents in Abuja. In other words, 64.2% of the variance in the choice of cargo agents operations at Abuja airport can be explained by the influence of the efficiency of customs operations, capacity of the airport in cargo handling and airport charges offered by the airport. Since by definition, R^2 will increase when further terms are added to the model, even if this does not explain variability in the population, the adjusted R^2 is an attempt at improving the estimation of R^2 in the population. The index is adjusted down to compensate for the chance increase in R^2, with bigger adjustments for larger sets of explanatory variables. The use of this adjusted measure leads to a revised estimate that 63.3% of the variability of the factors influencing cargo agents' choice of operations at Abuja airport can be explained by the three explanatory variables.

Cargo agents' choice for operations at any airport is dependent on two key characteristics of an airport's operations: the demand for service by aircraft operators and the capacity at the airport, both in airspace and the local environment. This will probably influence the volume and types of cargoes that attracted the choice for agents operations at airports. A major concern of airport management is the adequacy of an airport's capacity, specifically in relation to the layout of the airport's runways to handle the anticipated demand of

Table 6
Coefficients of choice factors for cargo agents operation in Abuja airport.

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.697	0.090		7.736	0.000		
	Airport capacity	0.080	0.014	0.344	5.939	0.000	0.951	1.051
	Customs efficiency	0.147	0.024	0.458	6.069	0.000	0.561	1.783
	Airport charges	0.082	0.021	0.285	3.846	0.000	0.581	1.721

(Source: Author's computation.)

Table 7
ANOVA of cargo agents choice factors.

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	7.510	3	2.503	67.091	0.000[a]
	Residual	4.179	112	0.037		
	Total	11.690	115			

[a] Predictors: (constant), customs efficiency, airport capacity, airport charges.
(Source: Author's computation.)

Table 8
Model summary of airport choice factors.

Model	R	R square	Adjusted R square	Std. error of the estimate
1	0.802[a]	0.642	0.633	0.193

[a] Predictors: (constant), customs efficiency, airport capacity, airport charges.
(Source: Author's computation.)

aircraft operations and cargo facilities in order to increase traffic that will lead to the preference of agents operations at the airport.

6. Policy implications and conclusion

An understanding of the variability of capacity, rather than its average value, is crucial to the effective management of an airport for cargo traffic growth that will attract choice of operations from cargo agents. For airport managers, the strategy for the successful management of an airport should involve devising ways to compensate for a number of factors that, individually or in combination, act to reduce the capacity of the airport. This should be done with a view to improving the capacity utilisation of the airport in cargo operations. While it is imperative for airport operators to give attention to the need for increased cargo traffic through efficient capacity management; it is also important that airports have adequate infrastructure for enhanced cargo operations capable of influencing the choice of cargo agents. The provision of the needed airport infrastructure for cargo traffic handling should be a major focus of the government. In addition, in a multi airport competing environment, the airport management should focus on inducing cargo agents and airlines with reduced/moderate charges. This may attract the decision of more airlines and cargo agents operations at the airport.

The study subjected 10 variables believed to have an influence on the choice of air cargo agents operations at Abuja airport to factor and regression analyses. Therefore, the study concludes that airport capacity, airport charges and customs efficiency serve as the most significant factors influencing the choice of cargo agents operating in Abuja airport, Nigeria. This study leaves a gap for further study on the subject that requires an assessment of the level of efficiency achieved at the airport in the customs clearance process in terms of time and cost. It also revealed the need to carry out an examination of the true value of airport charges in cargo operations at the airport. This is as a result of the relationship that exists between airport charges and customs efficiency since customs duties contribute to the overall charges on cargo clearance at airports.

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