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An Investigation Into the Airport Capacity Utilization: Evidence From Abuja And Kaduna Airports

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Abstract
This paper examines the Nigerian airports capacityy utilization and its level of service, using Nnamdi Azikiwe International Airport (NAIA) and Kaduna International Airport (KIA) as the case stud . From the survey carried out at the NAIA, show that average time for arrival screening is approximately 18.8 mins, for ticket purchase time spent is 2.29 minutes, while for baggage screening time spent is 4 minutes, check-in screening time spent is 5 minutes and 11 minutes for boarding gate screening and an averag of 8 minutes at the Apron gate. The study recommends that there is a need for an introduction of automated and modern scanners to these airports to improve the level of service quality and to reduce the time spent at the various service points.

Key words: UK, Nigeria, airport, capacity utilization, level of service

INTRODUCTION

Air transportation is among the key elements for socio-economic development of nations, as it connects people, goods and services to the rest of the world in a timely manner. In transportation choice of one mode over the other is based on several factors speed, price, safety, reliability and environmentally friendly mode (Pius et al. 2017). Air transport is one of the world's most important industries, its growth cannot be matched by any other major form of transport due to its technicality and new innovations (Nwaogbe et al.2017). Demand for air transport services increased its influence on the nation and global economy, thereby creating employment opportunities within and outside (supply chain), including revenue generation to the government through levies. sector. The sector has been instrumental in poverty alleviation and social mobility, especially in developing countries (Leucci, 2016; Nwaogbe et al. 2013).

This paper seeks to assess the capacity utilization of facilities at the NAIA and KIA, focusing on terminal building facilities, boarding gate, ticketing counter, checking counter, apron and gate facilities. Including factors such as processing time, waiting time, walking time, boarding time and availability of passenger amenities "convenience and comfort" were measured to capture the level of service level at these airports as recommended by (Pius et al. 2017; Mobolaji and Wilfred, 2011). So, to achieve the aim of this study, the following objectives will be addressed; evaluate airport terminal capacity and apron capacity utilization. Measure the level of service, using average waiting time across selected services at these airports. The rationale behind this study is to measure the impact of recent investment by the government in upgrading critical infrastructures at these airports. In the meantime, past researches at the national level have provided a robust underpinning and motivation for this work

Study Hypotheses

With an enormous pressure on the airports to improve aircraft movement, Nigerian airports are using both physical and human resources to achieve their corporate strategic goals, whilst believing on the managerial competencies to deliver on this important task. Therefore, airport productions such as aircraft movement, competence and the likely impact of the specified variables on the production level can be quantified with the following hypotheses;

H1 There is a statistica significant relationship between the movementt of aircraft and flight delay.

H2 There is a statistical significant relationship between the movement of aircraft and flight cancellation.

LITERATURE REVIEW

Contextual Background

Given the fact that both NAIA and KIA are owned and managed by the Federal Government, through the Federal Airport Authority of Nigeria (World Aero Data, 2010). Ogwude et al. (2018) suggest that under-utilization and poor level of service at the airport increase the numberr of delays and overcrowding at the terminals. Under-utilization with inefficient airport allocation and poor level of service are some of the reasons for airport congestion and delay in the emerging airports like Nigeria (Bubalo and Daduna, 2011). One of the measurements for airport capacity is maximum throughput or saturation capacity (Bubalo and Daduna, 2011). The practical hourlyy capacity is used to measure the capacity of airport in an hour period when the arrival and departure experience an average delay of 4 minutes, due to long queue or delay caused by poor level of service. While, sustained capacity is used to measure the number of aircraft movement per hour that can be sustained over a given hour (Kumer and Sherry, 2009). Air fares at congested airport will be higher when airport capacity is insufficient to accommodate passengers demand, as the excess passenger demand allow airlines to increase their air fares using econometrics analysis (Burghouwt et al. 2017). Inappropriate capacity utilization, poor level of service (LOS), passengers delay, airport overcrowding, and congestion are the major problems in the Nigerian airports today and often contributing to one third of why flights are delayed and cancelled.

An effective and efficient management of airport production system tend to increase productivity, efficiency and performance level. Oyesiku, Somuyiwa & Oduwole (2016) posit that airport capacity constraint, is one of the major factors that causes congestion and low schedule reliability, imposing unethical costs on the airlines and passengers. The departure time and fares are key elements in airline's ability to attract passengers and improve market share, it is apparent that this cannot be achieved without a combined effort of both the airport and airline as noted by Belobaba (2009). In addition to these two factors, on-time performance and service reliability plays critical role in maintaining and improving an airline's profitability and brand loyalty that the airline needs for business continuity (Bratu & Barnhart, 2005). The attractiveness of an airline, especially to the high-yield business class passenger, depend to some extent on reliability of the service provider. As Belobaba and Simpson (1982) pointed out lack of reliability service dimension can adversely affect airline revenues and image negatively (Flint, 2000; Januszewski, 2002).

Mobolaji and Wilfred (2011) conducted a study into airport capacity utilization in Nigeria, the investigation examined how most airlines in Nigeria fly at about the same time of the day creating great strains on the airports' runways and air traffic management system in the country. This study examines air traffic flow, recorded landings and take-offs times, arrival time, and times spent in the airport. The data collected were analyzed using the queuing theory to determine airport turnaround time and the rate of usage of the airport as well as time variation in usage patterns. The results of this research revealed that the nation airports were grossly underutilized; most domestic traffic movements have two main peaks period “morning and evening” with the headway been dangerously close. Incidentally, there is a great danger in aircraft clustering been closed to one another during take-off and landing maneuver, as a result of this occurrence it advised that to improve airport capacity utilization airlines’ scheduls should be spread evenly through the day. George et al. (2010) investigated how flight schedules might change if the airlines must align their schedules with the runway capacity of the airports, to achieve these goals, a novel modeling approach was considered. The model focus nonprofitt-seeking, single benevolent airline, and develop an airline economic model to improve its scheduling decisions. Airline is regarded as benevolent when it considers the historic pricing at LaGuardia and the associated price-elasticity and attempts to meet passengers need and demand effectively at all time, while still making sustainable profit.

In line with the above thought; Vikrant and Barnhart (2012) attempt to study airport capacity demand management strategies and its potential to mitigate congestion and delays. But, the extent to which these delays can be reduced, using recommended strategies were not very clear. In this study, they develop a bound on the minimum possible level of delays that can be achieved using these strategies. They resolve aggregated timetable development issue and fleet assignment problem to minimize the system-wide delays, assuming a single monopolistic carrier that satisfies all the passenger demand in the US and maintains the same level-of-service as achieved with the current revenue-management practices of individual carriers. Branko & Bubalo (2011) carried out research into airport punctuality, congestion and delay as scope for benchmarking, concluded that the airport performance benchmarking requires level-of-service indicators for a fair comparison among members of the same peer group. For a true performance analysis such inclusion of quality measure is necessary to differentiate airports with similar pure output quantities, i.e. number of aircraft movements. Since the variation of scheduled times versus actual times could substantially cause accumulating operating costs for carriers and could furthermore pose the risk and inconvenience of missed connections for the passengers. This study examines determinants of flight delays at airports, and thereby developing performance indicators such as slot capacity utilization, queuing time and punctuality. The underlying phenomena in queuing theory “Little’s Law, arrival and departure distributions, and cumulative throughput and demand diagrams”.

In recent years, airport capacity utilization topic has gained prominence in the sector, this has prompted researchers like Ogwude et al. (2018); Nwaogbe, Ogwude & Ibe (2017); Pius et al. (2017); Nwaogbe et al. (2017); Nwaogbe, Pius & Idoko (2017); Wanke, Nwaogbe, & Chen, (2017); Barros et al. (2017); Wanke, Barros, & Nwaogbe, (2016) to use complex econometric models “DEA, Fuzzy-DEA, SFA” in assessing various input and output variables in the airports, to determine their capacity utilization and level of efficiency. From their studies, the findings show a high significant relationship on productivity and efficiency, thus it is based on the variables used in the production assessments.

METHODOLOGY

Sample description and technique

Measuring of airport capacity utilization and level of service quality at the NAIA and KIA are the focus of this investigation. The tools used in data collection are; hourly survey and observation. In the survey, hourly observation was used to monitor and observed the passengers' demand, capacity /facility utilization, passenger delay caused by poor underutilization of the facilities, level of service for two weeks. Secondary data was sourced from the Federal Airport Authority of Nigeria (FANN). To analyze the data generated descriptive statistics and linear regression was used to analyze the data. Aircraft movement was used as the dependent variable, while delay flight and flight cancellation were independent variables. In this analysis; (Y) = dependent variable, while (X) = independent variable/predictor. Linear regression equation model formulated is presented as follows:

$(\hat{Y}=\boldsymbol{\alpha}+\boldsymbol{\beta 1x1}+\boldsymbol{\beta 2x2}+\boldsymbol{\beta 3x3}+\cdots\ldots\ldots+\boldsymbol{\beta nxn})$

Where, **y** = dependent variable (aircraft movement)

X1, x2, x3 = independent variables (flight cancellation, delay and reschedule)

$\boldsymbol{\alpha}$ = constant and

$\boldsymbol{\beta n}$ = coefficient of x.

Decision rule :

The significance level of the variable was tested using (F – Test) and (P – Test). The decision rule here states that: If P-value < significance level at alpha (0.05) then there is a significant relationship (i.e. reject Ho). If P-value > significance level at alpha (0.05) then there is no significant relationship (i.e. accept Ho)

DISCUSSION AND RESULTS

The analysis of data gathered from NAIA and KIA was done using descriptive statistics and SPSS.

Table 4.1 Aircraft movement, delays and cancel flight: NAIA (Domestic) 2003- 2016.

Year	Aircraft Movement	Delay	Flight Cancellation
2003	35854	80	9
2004	36855	100	13
2005	37885	113	15
2006	33322	70	8
2007	35262	80	10
2008	35166	341	24
2009	48506	350	30

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2010	53286	380	37
2011	57894	390	44
2012	56989	385	41
2013	56614	382	40
2014	60936	395	52
2015	50526	350	50
2016	50431	320	52

Source: FAAN (2017)

Table 4.2 Descriptive Statistics

	Mean	Std. Deviation	N
Aircraft	46394.71	10156.873	14
Delay	266.86	139.738	14
Cancellation	30.36	16.887	14

The descriptive statistics in table 4.2 reflects FANN data. It shows the mean and the standard deviation of the data.

Two variables were selected as independent variables, they are delay and cancellation of flights, while aircraft movement is selected as the dependent variable. Data analysis was carried out to test the relationship that exists between the dependent variable (aircraft movement) (Y) and the independent variable/predictor (X) (flight delay and cancellation), about the capacity utilization when there are delays and cancellation of flights.

Table 4.3 Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.910[a]	.829	.798	4568.334	.829	26.631	2	11	.000

a. Predictors: (Constant), Cancella, Delay

b. Dependent Variable: Aircraft

Table 4.3 above shows the model summary of the analysis. The summary of output shows the R square value of 0.829, which means that about 83% of the total aircraft movement is explained by the number of flight delays and cancellation as the explanatory variable during the analysis. The adjusted R value is 0. 798 which about 80%, this shows the dependent variable (aircraft movement) is explained by the explanatory variable and the value of the R square is reasonable. Finally, the multiple R value of 0.910 which is 91% shows that there is an overall relationship between the dependent variable (Y) and the independent variables or explanatory variables (X1and X2) (Pius et al. 2017).

4.2 Hypothesis 1

Table 4.4 ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1111540556.599	2	555770278.300	26.631	.000[b]
	Residual	229566420.258	11	20869674.569		
	Total	1341106976.857	13			

a. Dependent Variable: Aircraft
b. Predictors: (Constant), Cancellation, Delay)

Hypotheses testing in NAIA and KIA airports

For hypotheses testing, the parametric model was used to test regression analysis findings, to determine whether variables used for the analysis are significant on the dependent variable or not.

Hypothesis: There is no significant relationship between aircraft movement, flight delay and cancellation. From the ANOVA analysis, table 4.4 above shows the value of p-value calculated 0.00. Therefore, since the p-value calculated is less the 0.05 alpha value, the alternative hypothesis is accepted, this means that there is a significant relationship between the dependent variable (aircraft movement) and the independent variable (delays and Flight cancellation) of the airport capacity utilization and operational performance. More so, there is a positive significant relationship between the dependentt and independent variables of the flight operational delays and cancellation of flights since p-value < 0.05 alpha value. This implies that the higher the aircraft movement in terms of operations the lower the congestion and delay, and cancellation of flights at these airport terminals, thus airport capacity will be effectively and optimally utilized. This will increase the operational performance of the NAIA (domestic terminal), because aircraft movement has been increased to reduce the delays and flight cancellation. On the contrary, the higher the delays and flight cancellations, the more airport's terminal, runways and aprons are congested, thereby reducing the turnaround time of the airports. Delays and cancellationsreduces airportt productivity and efficiency, which contributes to a decrease in operational capacity and utilization (Barros et al. 2017; Pius et al. 2017; Wanke, Nwaogbe and Chen, 2017).

Table 4.5 Coefficients

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations		
Model	B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part
1 (Constant)	29031.924	2723.790		10.659	.000	23036.902	35026.947			
Delay	21.264	19.907	.293	1.068	.308	-22.550	65.078	.862	.307	.133
Cancella	385.027	164.725	.640	2.337	.039	22.471	747.583	.901	.576	.292

a. Dependent Variable: Aircraft

From the analysis, the table 4.5 presented various elasticity of independent variables (Delays, and flight cancellations). The elasticity of the β^1 (delay) shows a result of about (0.293), this implies that the elasticity of variable to the intercept is elastic. It means that if the β^1 (delay) increases by (10%) dependent variable will increase by (29%), that is more passengers and aircrafts will increase at the airport by 29% leading to congestion at the airports. The elasticity of the β^2 (cancellation) gives a result of about (0.640), implying that the elasticity of variable to the intercept is elastic. It means that if the β^2 (cancellation) increases by (10%), dependent variable will increase by (64%), that is there will be the increase of aircraft and passengers in the airports by 64% thereby affecting the airport capacity utilization (Nwaogbe et al. 2017).

4.4. NAIA Level of Service

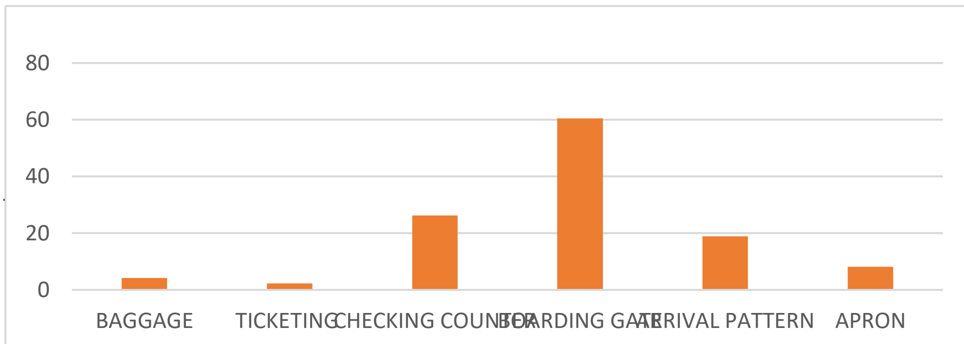

Figure 4.1 Graph showing average time spent at each service point for Abuja Domestic Terminal
Average time interval in (min) =Y-axis
Level of service = X- axis

Figure 4.1 shows that there is a relationship between the average time interval and the level of service, i.e. time it takes to access various service points. The graph shows an optimum capacity utilization level at various service points using time as an indicator. The line graph shows an increasing rise at the boarding gate service point due to the following reason, boarding gate security checks, waiting time at the terminal building and the final stage proceeding to the boarding gate. All this screening process makes a mean average time of 60%. Secondly, the check-in counter has a high rise of a mean average time of 27% due to self-service screening, and check-in counter services such as the issuance of a barcode boarding pass by the airliners, and this usually takes time in the airport with high level of demand. Thirdly, the arrival pattern has a mean average time of 19%, airport arrival pattern represents the proportion of passenger's arrival for check-in process, distributed by fixed time intervals. Ranging from a different time of the day. The faster the screening pattern the lesser the queue waiting to access the terminal building, the arrival is a very important factor to consider in the checking process.

Table 4.1 Arrival Screening

Days	No.	Minimum	Maximum	Mean	ST. Dev
DAY1	13	1	45	26.8462	14.2703
DAY2	13	4	40	17.2308	11.7129
DAY3	13	1	30	16.3846	7.89027
DAY4	13	1	30	17.4615	9.22511
DAY5	13	1	29	17.3846	8.24155
DAY6	13	1	30	17.9231	8.70308
Valid N (list wise)	0				

Source: Fieldwork (2017)

Arrival pattern: The arrival screening represents the proportion of passenger's arrival for check-in process, distributed by fixed time intervals ranging from different time of the day. The faster the screening pattern the lesser the queue waiting to access the terminal building. The arrival pattern is a very important factor to consider in the checking process. According to (Neufville and Odoni, 2004) when the arrival and departure experience an average delay of 4minutes due to queuing phenomena or other delays caused by the poor level of service, this leads to delay, congestion, and overcrowding of the terminal building capacity. Which however leads to underutilization of capacity. Using (Neufville and Odoni, 2004) for benchmarking of the Nnamdi Azikiwe International Airport passenger arrival. Table 4.1 shows an average mean of 18.87 minutes' maximum was spent at the airport, which means that the Nnamdi Azikiwe International airport is not optimally utilized, there will be queues on the arrival and departure.

Table 4.2 Ticket Purchase

Days	No.	Minimum	Maximum	Mean	ST. Dev
DAY1	13	1	5	2.0769	1.25576
DAY2	13	1	6	2.6154	1.7097
DAY3	13	1	6	2.8462	1.67562
DAY4	13	1	4	2.1538	0.80064
DAY5	13	1	4	2.1538	1.06819
DAY6	13	1	5	1.9231	1.38212
Valid N (listwise)	0				

Source: Fieldwork (2017)

Ticket purchase: purchase of ticket is done in two ways namely, manual ticket purchase and online purchase. Most airline operators, prefer the purchase of ticket online to avoid queue in the terminal building. The manual ticket purchase is done in the terminal building where by a dedicated stand is assigned by airliners for ticket sales in the terminal building. Most ticket purchase preference is mostly done online due to the ease and discount rate attached by airliners. According to International Air Transportation Association (IATA, 2009), the standard time for ticket purchase is 0-5 minutes, but from the survey, the average mean time spent as shown on the table 4.3 above is 2.295 minutes which means the airport is operating at the optimum level.

Table 4.3 Baggage Screening

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	13	1	40	5.5385	10.4532
DAY2	13	1	7	2.8462	1.81871
DAY3	13	1	19	3.8462	4.59794
DAY4	13	1	22	4.0769	5.48424
DAY5	13	1	22	4.1538	5.45964
DAY6	13	1	23	3.8462	5.84303
DAY7	0				
Valid N (list wise)	0				

Source: Fieldwork (2017)

Baggage screening: according to international air transport association (IATA) level of service concept for benchmarking optimum passenger terminal facilities, for baggage screening (IATA, 2009). The standard screening time for IATA is 1-5 minutes for self-service i.e.an average of 0-15mins on the average for domestic travel, for international flight, an average of 0-25mins, For Nnamdi Azikiwe international airport. The mean average time spent for baggage screening is 5mins on the average. However, using (IATA, 2009) for benchmarking the capacity utilization level, since an average of 5minutes is spent for baggage screening at NAIA, it means that the airport is operating at an optimum level, meaning capacity are effectively utilized.

Table 4.4.4 Check-in Counter

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	13	1	40	8.8462	13.8915
DAY2	13	1	14	4.3077	3.35123
DAY3	13	1	19	3.8462	4.59794
DAY4	13	1	22	4.1538	5.45964

DAY5	13	1	22	4.3846	5.8529
DAY6	13	1	23	4.1538	5.7857
Valid N (listwise)	13				

Source: Fieldwork (2017)

Check –in counter: Check-in is the first process undertaken by departing passengers at an airport. The check-in process allows passengers to check baggage with the airline and obtain boarding passes. During check-in, passengers receive specific flight information, can purchase additional in-flight services such as priority boarding, seat upgrade assignments, and equally can adjust their flight arrangements and reservations. Airport check-in counters open 2 hours before departure for Domestic flights, 3 hours for Regional and 4 hours for International flights. At the check-in counter, passengers are expected to present their boarding pass together with any form of identification card. All passengers must have completed check-in for their flight prior to check-in closure which is 30 minutes (for Domestic Flights), 45 minutes (Regional Flights) and 90 minutes (for International Flights) before the scheduled departure time. According to international air transport association, the maximum time for check-in for domestic travel is 15mins. According to International Air Transport Association (IATA, 2009) the check-in counter is divided into the self-service and checking-in counter, an average of 1-5mins is spent at the self-service point, while at the check-in counter has an average of 5- 10 minutes for domestic flight while 10-20minutes for international flight. At NAIA an average mean time of 5 minutes is spent at the check-in counter.

Table 4.5 Boarding Gate

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	13	4	31	15.3077	7.01646
DAY2	13	1	32	12.4615	8.57919
DAY3	13	1	23	10.4615	7.58964
DAY4	13	1	23	12.6154	8.23143
DAY5	13	1	22	7.9231	7.48845
DAY6	13	2	23	10.6154	7.81599
Valid N (list wise)	13				

Source: Fieldwork (2017)

The boarding gate: is an important area of an airport terminal, it requires an adequate space for passenger while waiting for boarding. It is also a vital component of the passengers' travel experience, according to International Air Transport Association (IATA, 2009) passenger are expected to spend an average time of 30mins for both security screening, waiting and boarding. From the study, the table 4.5 above shows that an average time of 12 minutes is spent at the boarding gate, it means that the airport capacity is fully utilized, and its level of service is in order, it is also operating at optimum standard as regards to International Air Transport Association standard.

Table 4.6 Apron Gate

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	13	1	15	6.7692	4.78111
DAY2	13	1	32	9	8.43603
DAY3	13	1	25	8.1538	7.44811
DAY4	13	1	24	8.9231	7.01738
DAY5	13	1	22	7.9231	7.48845
DAY6	13	1	23	7.5385	6.45
Valid N (listwise)	13				

Source: Fieldwork (2017)

The airport apron is the area of an airport where aircraft are parked, loaded, unloaded refueled, or boarded. It is the final stage passengers get to before boarding a flight. However, the Apron is not usually open to the general public because of its sensitivity, the NAIA accommodates an average of 15 aircraft daily as observed from the field survey with over (6) boarding gates for domestic travel. Table 4.6 shows that it takes an average of 8 minutes for passengers to board an aircraft which shows that the airport is operating at an optimum level.

4.5.1 KIA (Domestic) Level of Service

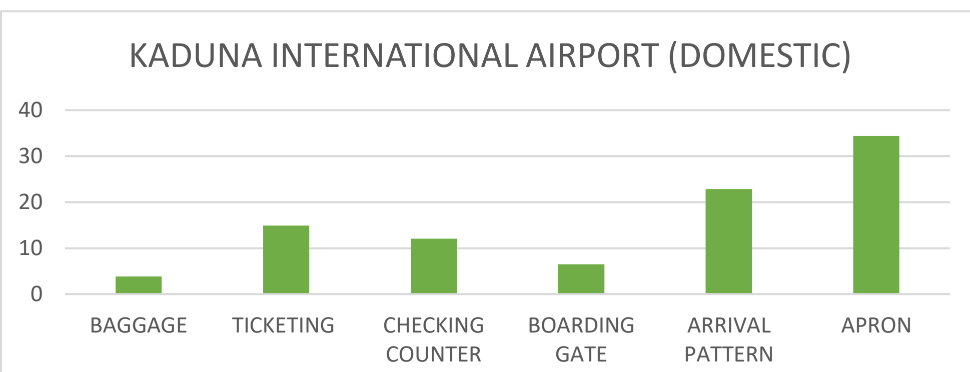

Figure 4.5.1, Graph showing the average time spent at each service point in Kaduna Domestic Trerminal

Figure 4.5.1 shows an increase of 34% delay was experienced around the apron and gate, this is caused as a result of late arrival and departure of flight, operational delay caused by aviation fuel, maintenance checks on aircraft and lesser apron size to accommodate more traffic demand as against the normal scheduled demand of 3 aircraft. However, this means that the airport under-utilization of the apron capacity leads to flight delay and cancelation, this problem puts pressure on existing terminal capacity. Secondly, the arrival pattern shows a rise of 23%, this is as a resultof the high demand for air travel. At the screening and arrival security checks, there tend to be a delay this because of inadequate checking and screening machines. For examples screening of people to walk through a metal detector was limited at the Kaduna International Airport (Domestic Terminal).

Table 4.5.1 Ticket purchase

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	13	1	5	2.6154	1.3253
DAY2	13	1	6	2.5385	1.56074
DAY3	13	1	6	2.8462	1.40512
DAY4	13	1	4	2.3846	0.96077
DAY5	13	1	5	2.3846	1.19293
DAY6	13	1	5	2.1538	1.40512
Valid N (listwise)	13				

Source: Fieldwork (2017)

Ticket purchase: purchase of ticket is done in two ways namely, manual ticket purchase and online purchase. Most airline operators, prefer the purchase of ticket online to avoid queue in the terminal building. The manual ticket purchase is done in the terminal building where by a dedicated stand is assigned by airliners for ticket sales in the terminal building. Airliners reduce ticket rate for passenger who buy online to discourage passengers from buying from the airport terminal.

From the table 4.51. It takes an average mean time of 2.8mins for purchase of ticket at Kaduna International Airport without system failure this is due to passenger online booking preference.

Table 4.5.2 Arrival screening

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	13	8	45	29.4615	12.0043
DAY2	13	13	40	23.2308	10.0263
DAY3	13	13	45	25.8462	9.94859
DAY4	13	1	40	13.6154	15.7931
DAY5	13	10	32	21.9231	6.42212
DAY6	13	9	38	23.1538	8.34512
Valid N (listwise)	13				

Source: Fieldwork (2017)

Arrival check in: Represents the proportion of passenger's arrival for check-in process, distributed by fixed time intervals. Ranging from different time of the day. The faster the screening pattern the lesser the queue waiting to access the terminal building, the arrival is a very important factor to consider in the checking process, it includes the various security checks and processing before flight boarding. From the table above, it takes a mean average of 23mins for screening of passengers at KIA, using IATA (2009), for bench marking of arriving and departing passenger the maximum time passenger should spend for domestic travel is 1-5mins on the average for self-service checking and an average of 1-5mins for domestic flights. However, from the table shown above, the KIA is not operating at optimum level, thus this would lead to airport underutilization of the airport terminal capacity, causing pressure on capacity and resulting to airport congestion and delay.

Table 4.5.3 Checking counter

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	12	1	16	6.3333	5.19324
DAY2	12	1	20	10.4167	6.54298
DAY3	12	10	22	16.1667	3.43335
DAY4	12	10	19	13.4167	2.10878
DAY5	12	12	15	13.25	1.13818
DAY6	12	12	15	12.8333	1.02986
Valid N (listwise)	12				

Source: Fieldwork (2017)

The checking counter remains a very key area in the terminal building at this service point, passenger is expected to present their boarding pass and bags for tagging. The mean average time for checking of passenger using the international air transportation association for benchmarking of checking counter for domestic travel is 0-15mins while for international flight is 0-20minutes. Table 4.5.3 shows that it takes an average mean of 10minutes for checking, meaning that the airport is operating at an optimum level.

Table 4.5.4 Baggage screening

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	26	1	40	5.8077	10.147
DAY2	26	1	14	3.7692	2.65793
DAY3	26	1	19	3.2308	3.2779
DAY4	26	1	22	3.3462	3.92879
DAY5	26	1	22	3.4231	4.24427
DAY6	26	1	23	3.3846	4.13838
Valid N (listwise)	26				

Source: Fieldwork (2017)

Baggage screening: At KIA, an average mean time of 5.87minutes for baggage screening, bag tagging and transfer by handlers to the apron for loading was spent. Using the International Air Transportation Association for benchmarking the capacity utilization level, the KIA is operating at an optimum level.

Table 4.5.5 Apron gate

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	22	1	40	8.0455	11.0861
DAY2	22	1	14	4.6818	2.66166
DAY3	22	1	19	4.4545	4.79809
DAY4	22	2	22	5.3182	5.87478
DAY5	22	1	22	4.7273	4.45273
DAY6	22	1	40	7.1364	9.24428
Valid N (listwise)	22				

Source: Fieldwork (2017)

Apron gate: It is an area in an airport where aircraft are parked for either loading or unloading ,refueling and checks, At KIA it takes an average of 6minutes for Passengers to board an airplane in KIA, according to the IATA (2009) the standard time used for benchmarking of the Apron terminal building capacity is 10 minutes which means the airport is operating at an optimum level.

Table 4.4.6 Boarding gate waiting time

	N	Minimum	Maximum	Mean	Std. Deviation
DAY1	22	1	40	8.9545	11.2143
DAY2	22	2	17	8.6364	5.26032
DAY3	22	1	19	4.4545	4.79809
DAY4	22	2	22	5.2727	5.88931
DAY5	22	1	22	5.2727	6.12708
DAY6	22	1	25	6.5	7.55771
Valid N (listwise)	22				

Source: Fieldwork (2017)

Boarding gate: the boarding gate area is an area of the airport terminal that provides the waiting area for passenger before boarding their flights, it is categorized into the boarding screening area, waiting hall and the departure gate area, it takes a mean average of 6.4minutes at the boarding gate area. This area is one of the most sensitive areas in the airport terminal if capacity is poorly utilized in this service point it leaves pressure on the waiting hall capacity thus leading to overcrowding in the waiting hall. From the survey conducted, once there is a service failure in the airport terminal building, because of poor underutilization of capacity, or cancellation of flight due to operational reasons or late arrival of flight, it leaves pressure on the waiting hall thus leading to congestion and overcrowding.

RECOMMENDATIONS

From the survey carried out at the NAIA, show that average time for arrival screening is approximately 18.8 mins, for ticket purchase time spent is 2.29 minutes, while for baggage screening time spent is 4 minutes, check-in screening time spent is 5 minutes and 11 minutes for boarding gate screening and an average mean of 8 minutes at the Apron gate. While at KIA, it is overserved that the average time was 2.8 minutes is spent at the ticketing point, 23 minutes for screening of arriving passengers,10 minutes at the check counter, baggage screening time was 5.8 minutes, at the apron gate 6 minutes was spent and 6.4 minutes were spent at the boarding gate. Based on the IATA standard for benchmarking and international best practice of the airport sector, the findings revealed that the NAIA is operating at the optimal level, compare to KIA. The study recommends that there is a need for an introduction of automated and modern scanners to these airports to improve the level of service quality and to reduce the time spent at the various service points. Air transport policy in Nigeria should considers factors such as infrastructure, workforce competency and current organisation practices, for standardization to improve competition within the industry. For example, new policy can be based upon the airport characteristic, using both homogeneity and heterogeneity variables in enhancing capacity utilization and service delivery.

CONCLUSION

This paper sought to measure airport capacity utilization and level of service at the newly upgraded KIA and NAIA. The investigation was done using regression analysis, as it allows simultaneous measurement of dependent and independent variables and their impact on the service delivery at these airports. The study analysis confirms that NAIA is more efficient in-service delivery and capacity utilization in all service dimensions assessed than the KIA. The foremost implication of the study findings; a single standard is required for the nation's airports with similar capacity, especially forresource allocationn and usage. The study confirms that the major source of delays at these airport terminals is check-in counter, screening service point and apron areas, because of insufficient numbers of airline staff during peak period. In addition, the security screening process is a service point where passengers spend much time at the boarding gate they are subjected to scanning and screening. At NAIA it takes an average time of 8 mins and 11mins of the total average time spent in the airport. This study observed that in-adequate of airline staff, lack of schedule and informative screen for display of next schedule flight, a delayed flight and canceled flight are major concerns for the stakeholders. It was discovered during the observation that there is an information gap between passenger, airport and airline operators, casing cynicism and dissatisfaction among service users at these airports.

It is suggested that there is a need for an introduction of automated and modern scanners to these airports to improve the level of service quality and to reduce the time spent at the various service points.To increase these airports' level of service and improve capacity utilization FAAN authorities should design shared guidelines for allocation and consumption of physical resources for airports with similar capacity. In effect, air transport policy in Nigeria should considers factors such as infrastructure, workforce competency and current organisation practices, for standardization to improve competition within the industry. For example, the new policy can be based upon the airport characteristic, using both homogeneity and heterogeneity variables in enhancing capacity utilization and service delivery

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