Factor Analysis of Domestic Air Travel Purposes in Nigeria

By

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Abstract

This study determines the trip purposes of domestic air passenger travel in Nigeria. Primary data was gathered from air passengers with random and systemic sampling techniques. 71.1 percent of questionnaires were retrieved from respondents in Lagos, and 61.9 percent of questionnaires were retrieved from respondents in Abuja. Factor analysis was employed for data analysis. From the study, factor analysis reveals five extracted variables; Religious purpose, Education or Conference purpose, Political purpose, Business purpose, and Health purpose are the major purpose of domestic air travel in Nigeria which falls under the category of tourism purpose. Hence, this study reveals that the purpose of domestic air travel tend towards tourism.

Keywords: trip purposes, domestic passengers, and air travel

Introduction

Transportation appears to be an economic activity different from the others. It trades space with time and thus money. The goal of transportation is thus to transform the geographical attributes of freight, people or information, from an origin to a destination, conferring them an added value in the process. The convenience at which this can be done varies considerably (Adams, Koncz and Vonderohe, 2001). The specific purpose of transportation is to fulfil a demand for mobility, since transportation can

only exist if it moves people, freight and information around. Otherwise it has no purpose. This is because transportation is the outcome of a derived demand (Ausubel and Marchetti, 2001).

What takes place in one sector has impacts on another; demand for a good or service in one sector is derived from another. For instance, a consumer buying a good in a store will likely trigger the replacement of this product, which will generate demands for activities such as manufacturing, resource extraction and, of course, transport (Hoyle and Smith, 1998). What is different about transport is that it cannot exist alone and a movement cannot be stored. An unsold product can remain on the shelf of a store until a customer buys it (often with discount incentives), but an unsold seat on a flight or unused cargo capacity in the same flight remains unsold and cannot be brought back as additional capacity later. In this case an opportunity has been missed since transport supply is higher than transport demand. The derived demand of transportation is often very difficult to reconcile with an equivalent supply (Hoyle and Smith, 1998; Tolley and Turton, 1995; John, 2007; Adeniran and Fadare, 2018).

Trip Purpose of air travel have been classified according to Frankseco (2013) into two broad classification;

1. Personal classifications: This category includes all purposes of tourism trips that are not classified as business and professional. They include holidays, leisure and recreation, visiting friends and relatives, Education and training, health and medical care, religion/pilgrimages, shopping, transit, and other.
2. Business and professional: This classification is with the aim to help determine whether the trip qualifies of air trip, to determine whether the traveller qualifies as the trip. This category includes the activities of self-employed, and employees, as long as they do not correspond to an implicit or explicit employer-employee relationship with a resident producer in the country or place visited. Furthermore, they include trips for meetings, conferences or congresses, working as guides or other tourism professionals, Contracting accommodation

and transport services, scientific or academic research; participating in non-governmental organizations missions;, participating in foreign government missions, promoting, purchasing, selling or buying goods or services, concerts, shows and plays giving lectures, trade fairs and exhibitions, participating in professional sports activities, Formal or informal on the job training courses.

Transport is one of the most important aspects in the day-to-day life of the people, as their activities cannot be fulfilled without moving. The people's movement closely related with their social demographic characteristic such as gender, age, marital status, occupation, education level and as well as the activities of the family members. The activities are based on different purposes, which are working activities, educational activities, shopping, recreational activities and so on (Madhuwanthi, Marasinghe, Rajapakse, Dharmawansa, and Nomura, 2015).

Möller, Weiermair, and Wintersberger (2007) gave a good overview of different studies and outline factors that drive the demand for travel among seniors including higher life expectancy, high disposable income (also due to savings) or good state of health. Their study reveals that reasons for not travelling include the lack of financial means as well as deteriorated health status. Sakai et al. (2000) focus on the travel demand among older Japanese citizens considering different effects including age and time. All studies show that the group of senior travellers is very prone to travel, a development continuing in the future since travel behaviour is likely to manifest over time, e.g. travelling can be considered as "learned behaviour" (Möller et al., 2007). This means that today's 30-year olds, for example, pursue their particular travel patterns to a high degree when they get older. Regarding the behaviour of young travellers, studies by the World Tourism Organization (UNWTO) (2016) as well as a report by the International Student Travel Confederation (ISTC) together with the Association of Tourism and Leisure Education (2003) investigate the travel planning, expectations and trip duration, amongst others, of this particular group.

The UNWTO report looks at travellers between the ages 15 to 29 which account for approximately 23 per cent of all global travellers. The major motivation for this group is the experience of new cultures, getting to know local people and to "live local". Furthermore, with more students enrolling in higher education, studying abroad becomes increasingly important. Although student or young travellers often only have a low budget, e.g. being money poor but time rich, their travel expenditures within a country or region are not necessarily lower than those of a tourist with a higher income. This can be accrued to the longer trips young travellers often conduct; their expenditures accumulate to a high level as well. In addition, some of these travellers combine their travelling with work in the respective destination in order to maximise their use of budget.

The ISTC (2003) report is based on a detailed survey among global travellers aged mostly below 26 and confirms many aspects of the UNWTO study. The main reasons for travelling are getting to know new cultures, the pleasure of travelling itself as well as enhancing one's knowledge. Already in 2002, the year of the survey, the internet was the predominant mode for young travellers to plan and book their trip. Considering that a high share of this group travels to long-distance destinations, air transport is the mode used mostly. Furthermore, as stated in the studies about senior travellers, young travellers also experience some kind of travel learning or "travel career", which means building up experience and accumulating knowledge regarding travel itself and different destinations. In addition, the group of young travellers is not homogeneous but differs according to travel destinations, age, income level, or experience sought.

According to George (2004) as well as March and Woodside (2005) travel motivations can be considered as one of the most important psychological influences of tourist behaviour. Motivations are the inner state of a person, or certain needs and wants of a person, which forces them to act or behave in a specific way and thus sustaining human behaviour and energy levels of the human body (Decrop, 2006; George, 2004). Maslow‟s theory is one of the most frequent used to explain the premise of motivation. Maslow uses

five sets of goals which are also referred to as basic needs: physiological needs, safety needs, social needs, self-esteem and self-actualisation (Tikkanen, 2007). Air travellers may need to escape, relax, to gain relief of physical and mental tension and for typical sun lust reasons. Crompton (as cited by Saayman, 2006) identified seven socio-psychological factors which motivate a tourist to travel: escape from an everyday environment, discovery and evaluation of oneself, relaxing or participation in recreational activities, gaining a certain level of prestige, for the purpose of regression, strengthening family ties and facilitating their level of social interaction.

The two studies found, were Correia, Oom do Valle and Moço (2007) who conducted research on the travel motivations of tourists to exotic places and Chang (2007) who did an analysis of travel motivations of package tour travellers. Chang (2007) indicated that the motives for package tour travellers are: relaxation and pleasure, social relationships, socio-economic factors and socio-psychological needs. On the other hand, Correia et al. (2007) identified the travel motivations to exotic destinations: knowledge, leisure, socialisation, facilities, core attractions and landscape features. These two studies do not exhibit much correlation except for socialisation and leisure factors. A reason for this could be that travellers who travel to different destinations have different travel motivations which emphasises the importance of this research study.

Travel related decision-making and behavior are prominent areas of study within the transportation and air travel, because travel plays a vital role in the world economy. Two of the most notable topics studied within the transport literature are where individuals travel on different purposes and what travel mode they use to get there, with a variety of modeling methods being employed to analyze these choices (Witt & Witt, 1995; Johnson & Ashworth, 1990; Lim, 1997; Sirakaya & Woodside, 2005). Some of these modeling methods focus on travel destination choice, others on travel mode choice, and a few others on destination and mode choices as part of a more comprehensive system of the overall decision process.

Travellers are concerned about the choice of travel modes according to their trip purpose that required to be fulfilled (Joe, Mark, and John, 2015). The availability of the travel modes is different and travellers can choose the mode with their desire to complete their trip. The travelling modes are now becoming with different aspects from the conventional models. Recently travellers tend to choose the mode with high comfort, security, vehicle in time, trip distance, time reliability, cost of the travel mode etc. with different availability of travel modes since the travellers have various opportunities to choose the mode (Eriksson, 2008). For instance, aircraft is fast, comfortable, safe, convenient, and provides carrying capacity, privacy and expensive travel mode than other transport mode. Thus the aircraft is instrumental to perform activities in different places, such as work, shopping, and leisure activities. The purpose of transport mode is probably one of the most important classic models in transportation planning. Mode choice modelling directly deals with the behavioral aspect of human nature thus it needs to closely monitor and understand the factors that affect this decision making procedure. Air travellers are concerned about the purpose of trip to be fulfilled before considering travelling by air.

Aviation is one of the indices for measuring the development of a country. The effect of this which is typically characterized by business cycles or alternation between periods of economic growth and downturns, brings about our data series exhibiting cyclical patterns or seasonality. Furthermore, every economy is highly susceptible to a variety of shocks of different nature (economic, political, climatic etc), which are likely to modify the past trends and the volatility in thedata (Bougas, 2013). As air travel is finding its feet in the Nigerian air transport sector, there are need to understand the reason why people travel by air in Nigeria. The study answered the main reasons why domestic passengers travel by air in Nigeria. This study is limited to domestic passengers and domestic airlines in Lagos and Abuja Airports. The Lagos and Abuja airports were chosen because they are the major domestic airports in Nigeria with highest traffic Year of Year.

Determination of trip purposes for air travel will help to give a clear direction and further understanding of previous studies on air travel forecast. Examples of forecasting studies are Adeniran (2019), Adeniran and Stephens (2018), Adeniran and Kanyio (2018), Adeniran and Ben (2017),

Methodology

Judgments were made to obtain the sample size of the study by reducing the mean year estimate data to the period of one weekly estimate and taking 1 percent of one weekly estimate. The technique of sampling the passengers and airlines for primary data collection was both random and systemic sampling techniques.

The populations for this study are domestic air passengers in Nigeria since the study focused on demand for domestic air travel passenger in Lagos and Abuja Airports. To specifically put it, the population was those volumes of passengers using the two airports being studied within the study period when data gathering occurred. We were at the two airports for one week each. To get the target population for the one week period at each airport we use the average passenger volume per annum for domestic passenger movement from a ten year period. Research population for Murtala Muhammed Airport 2 (MMA2), Lagos is 3,632,620 per annum. Research population for Nnamdi Azikiwe Domestic Airport (NADA), Abuja is 3,273,493 per annum. The weekly population was estimated to be 75,680 and 68,198 for Lagos and Abuja respectively.

To determine the sample size of the study, the some judgments were made by reducing the mean year estimate data to the period of one weekly estimate. Also 1 percent of one weekly estimate was chosen because of time limitation and the readiness of respondents to fill the questionnaires. This is shown in Table 1.

Table 1: Sample size determination of the study

AIRPORT	Estimated Yearly Mean	Estimated One Monthly mean	Estimated One weekly mean	Sample size (being 1 percent of the weekly mean).
Lagos	3,632,620	302718	75679.5	757
Abuja	3,273,493	272791	68197.75	682
TOTAL				1439

Source: Sidiq (2018).

The sample size was 1439 respondents. The technique of sampling the passengers and airlines for primary data collection was both random and systemic sampling techniques because the population is large and selection were done according to a random starting point and at a fixed periodic interval. The weekly population estimates are 75,680 and 68,198 for Lagos and Abuja respectively and going by a 1 percent sampling size of the weekly population, a total of 108 passengers/respondents were targeted daily between the hours of 7 am to 7 pm with an average of 9 persons per hour the study in MMA2. While for NADA 97passengers/respondents were targeted for the same period and an average of 8 persons per hour. It meant that an average of 6.7 minutes was spent with each respondent in Lagos and 7.5 minutes with Abuja respondents. Primary data was collected at two selected airports. In Abuja and Lagos, data collection started simultaneously from 5thto 11th of March 2018 and 12th to 19th of March 2018 for Lagos and Abuja respectively. The primary data were collected using questionnaires.

For data analysis, determination of the domestic trip purposes following variables (leisure, religious, politics, business, education, health, sport and others) was analyzed using and factor analysis.

Factor analysis model

Factor analysis model belongs to the General Linear Model (GLM) family of procedures bearing same assumptions as multiple regressions e.g. linear relationships, interval or near -interval data, latent variables, proper specification including relevant variables and excluding extraneous ones, lack of high multicollineraity, and multivariate normality. It is a generic term for a family of statistical techniques concerned with the reduction of a set of observable variables in terms of small number of latent factors. It has been developed primarily for analyzing relationships among a number of measurable entities (such as survey items or test scores) (George & Mallery, 2003; Nimalathasan, 2009).

Factor analysis is a statistical method used to reduce a large cloud of data to a little amount of complex factors (in this case complex factors reflecting on passenger satisfaction), to detect the attendance of substantial patterns among the initial variables (Black, Hair, Tatham, Babin, and Anderson, 2007) and to elicit the main factors representing relationships between the sets of many interrelated variables (Warne and Larsen, 2014).

If the observed variables are X_1, X_2 …. X_n, the common factors are F_1, F_2 … F_m and the unique factors are U_1, U_2 …U_n , the variables may be expressed as linear functions of the factors:

$X_1 = a_{11}F_1 + a_{12}F_2 + a_{13}F_3 + \ldots + a_{1m}F_m + a_1U_1$

$X_2 = a_{21}F_1 + a_{22}F_2 + a_{23}F_3 + \ldots + a_{2m}F_m + a_2U_2$

…

$X_n = a_{n1}F_1 + a_{n2}F_2 + a_{n3}F_3 + \ldots + a_{nm}F_m + a_nU_n$

Each of these equations is a regression equation; factor analysis seeks to find the coefficients a_{11}, a_{12} … a_{nm} which best reproduce the observed variables from the factors. The coefficients a_{11}, a_{12} … a_{nm} are weighted in the same way as regression coefficients because of some reasons: the variables are standardised, and the constant is zero

Where

F = Purposes of domestic air travel in Nigeria; the following variables (Leisure purpose, Business purpose, Education or Conference purpose,

Religious purpose, Health purpose, Political purpose, Sport purpose, and Others)

Results and Discussions

For primary data, information was gathered from air passengers and airline operators. A total of seven hundred and fifty-seven (757) questionnaires were distributed to passengers in Lagos airport, while six hundred and eighty-two (682) questionnaires were distributed to passengers in Abuja airport. In Lagos, five hundred and thirty-eight (538) questionnaires were retrieved having been filled completely and returned, while in Abuja, four hundred and twenty-two (422) questionnaires were retrieved. According to Mugenda & Mugenda (2003) and Fadare & Adeniran (2018) a response rate of 50 percent is adequate for data analysis and reporting; a rate of 60 percent is good and a response rate of 70 percent and over is excellent. Hence, 71.1 percent for Lagos, and 61.9 percent for Abuja response rates for this study are acceptable for the data analysis and reporting as shown in table 2.

Table 2: Questionnaire administration among airlines' passengers

S/No	Airlines	Administered		Valid questionnaire returned	
		Lagos	Abuja	Lagos	Abuja
1	Aero Contractors	96	96	69	59
2	Air Peace	148	136	106	84
3	Arik Air	157	142	111	87
4	Azman Air	15	2	9	2
5	Dana Air	93	89	67	57

6	First Nation Airways	47	42	33	26
7	Med-View Airlines	59	53	42	31
8	Overland Airways	142	122	101	76
Total		**757**	**682**	**538**	**422**

Source: Sidiq, 2018

Purpose of trip for domestic air travel in Nigeria was analyzed with simple descriptive statistics and factor analysis. This approach gives basis for comparing results and establishing facts.

Factor analysis of domestic trip purpose

The following factors such as leisure, business, education or conference, religious, health, political, sport, and others have been established by various authors to be the purpose of air travel demand. The major purposes of domestic air travel demand in Nigeria were analyzed using factor analysis as shown in tables 4, 5, 6, 7, and 8.

For the purpose of clarification in the analysis, the following should be noted: Leisure purpose (1), Business purpose (2), Education or Conference purpose (3), Religious purpose (4), Health purpose (5), Political purpose (6), Sport purpose (7), and Others (8).

Table 4: Correlation Matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Correlation	1	1.000						
	2	.363	1.000					
	3	.281	.672	1.000				
	4	.451	.534	.665	1.000			
	5	.474	.582	. 763	.728	1.000		
	6	.258	.067	.671	. 658	.743	1.000	

7	-.378	.293	.293	. 851	.378	.293	1.000	
8	.577	.447	.149	.760	.763	.447	.655	1.000

Table 4 shows correlation matrix based on correlation values. The variables with bold correlation values are related. This gives an idea of what is going on with the variables such that the unrelated variables will be removed. Also, the suspicion of multicolinearity has to do with correlation value that is more than 0.8; such variable will also be removed, in this case there is no problem of multicolinearity as no value is more than 0.8. This table revealed that the relationships between those variables are adequate to be used and the tendency of giving a realistic result is high.

Table 5: Communalities

Variables	**Initial**	**Extraction**
1.	1.000	.235
2.	1.000	.728
3.	1.000	.816
4.	1.000	.894
5.	1.000	.714
6.	1.000	.758
7.	1.000	.493
8.	1.000	.551

Extracted values shown in table 5 helps to determine the proportion of variables to be explained. The variables with highest extracted values will be explained. There are five variables to be extracted respectively; they are

Religious purpose, Education or Conference purpose, Political purpose, Business purpose, and Health purpose in hierarchy. These ones are the variables with high extraction values, and they are the major purpose of domestic air travel in Nigeria as revealed by this study.

Table 6: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.047	33.854	33.854	3.047	33.854	33.854
2	2.350	26.114	59.969	2.350	26.114	59.969
3	1.622	18.025	77.993	1.622	18.025	77.993
4	1.135	12.616	90.609	1.135	12.616	90.609
5	.766	8.514	99.123			
6	.051	.563	99.687			
7	.028	.313	100.000			
8	3.20E-016	3.56E-015	100.000			

From table 6, the following four purposes: Religious purpose, Education or Conference purpose, Political purpose, and Business purpose were 90.609% variance explained as the major purposes of domestic air travel demand in Nigeria, and their Eigenvalues exceeds 1.

Table 7: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.593
Bartlett's Test of Sphericity	Approx. Chi-Square	441.396
	Df	55
	Sig.	.000

The KMO (Kaiser-Meyer-Olkin) score is more than 0.5 for aggregated variable and that score implies that the analysis can be continued further for all the given purposes in the table. The Bartlett's significant score is 0.000 for each variable and then it continues to further analysis. The strong correlation can be indicated by the matrix correlation of determinant score approaching zero (0) score. It can be seen through Bartlett's Test of Sphericity. The sphericity test is based on the Chi Square transformation from the correlation matrix determinant.

In order to conclude this fact achieved by the objective, the result of simple descriptive statistics was compared with the result of factor analysis through ranking, as shown in table 8. Rank was carried out from the result obtained from factor analysis.

Table 8: Purpose of Trip

Purposes	**Factor Extractions**	**Rank**
Leisure	.235	8
Business	.728	4
Education/Conference	.816	2
Religious	.894	1

Health	.714	5
Political	.758	3
Sport	.493	7
Others	.551	6

It can be affirmed that the major purposes of domestic air travel in Nigeria are religious purpose and education or conference purpose which falls under the category of tourism purpose.

Conclusion

Analysis was based on primary data to enhance robustness of this study. Purpose of trip for domestic air travel in Nigeria was analyzed with factor analysis. From the study, factor analysis reveals five extracted variables; Religious purpose, Education or Conference purpose, Political purpose, Business purpose, and Health purpose are the major purpose of domestic air travel in Nigeria which falls under the category of tourism purpose. Hence, this study reveals that the purpose of domestic air travel tend towards tourism.

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