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Choice Determining Factors and Attributes of Urban Transportation by Travellers: A Case Study of the Accra-Takoradi Route, in Ghana.

Samuel Alphonse Etsibah[1] & Ernest Agyemang[2]

[1]Physical Development and Municipal Directorate, University of Ghana, Legon, Accra.
setsibah@ug.edu.gh
[2]Georgraphy and Resource Planning, University of Ghana, Legon, Accra. eagyemang@ug.edu.gh

Abstract
Several factors come to play when determining the reasons for the choice of a specific mode of transport. These may broadly be classified into characteristics such as the purpose, objective of the trip, attributes of the transport services and the socio-economic and demographic status of the traveller. The objective of this paper is to find the factors and attributes that influence the choice of transport modes. The primary data was generated from input on travellers at various transport terminals in Accra. Independent variables, such as the socio-economic and demographic factors of passengers, were tested to show how they influenced the dependent variable being choice of transport modes. The influence of other, variables such as the perceived and physical attributes of transport services were analysed. Using quantitative methods, such as surveys enabled primary data to be collected and analysed using univariate, bivariate analysis and multinomial logistic regression. The data showed that many variables and attributes influence travellers choice of transport services or mode. They included the socio-economic and demographic factors of passengers, such as income, occupation and distances from origin and destinations. The paper concludes with some policy, practical and theoretical recommendations.

Key words*: Transport attributes, Transport modes, Inter-urban, Intra urban, Choice characteristics*

Introduction

Travel behaviour studies have in the past focused traditionally on travel time, cost and socio-economic factors (van Acker, et al., 2010). Lifestyle decisions may be associated with changing transport mode choice habits over some time, (Bowman & Ben-Akiva, 2001). However, physical and perceived transport attributes have also influenced mode selection (Redman, Friman, Gärling, & Hartig, 2013). Even though a transport attribute is a trait that characterises transport modes, with absolute values from the individual, these attributes may be either generic for all modes or specific to some transport mode. Therefore, each transport mode or transport service may have its unique attributes. Transport attributes may be further classified as physical or perceived (Redman et al. 2013). The distinctions between these two attributes are; Physical attributes are generally tangible. These can be seen, touched, experienced or felt, while the perceived attributes are mostly

the intangible ones that cannot be seen or touched. Regardless of this categorisation, each attribute has the potential to influence transport service selection. The attributes of transport service quality are essential because they are measured based on the level of satisfaction experienced by the passengers. In order words, the measure of service quality is from the passenger's perspective, based on their perception of the services rendered (Redman, et al., 2013). From various researches, it is evident that different transport attributes influence passenger mode choice and passengers are sole judges of transport service quality (Imhimmed et al., 2018). This finding establishes the relevance of this present study.

Theoretical perspective of transport mode choice

Choice decisions appear in all spheres of life and societies. Transport decision theories and models serve as a guide to understanding the mode choice processes and actions (Schneider, 2013) and, (Yang, 2016). Theories such as unplanned decision making, traditionally assumes that passenger's itinerary and choice of mode does not change during the trip. This assumption maybe erroneous and cannot be entirely accurate all the time. Hence there is also the theory of planned behaviour, that emphasizes that social behaviour of people can be controlled. Also, a person's original intention can influence the actual travel mode choice (Bamberg & Schmidt, 1998); (Lee & Elgammal, 2004). Then, the theory of dynamic decision making, also characterises making choices among various actions and alternatives at different points in a specific time, to control and optimise performances in a dynamic stochastic system, (Baslington, 2008). There is also the theory of Routine Mode Choice Decisions which suggests that broad mode shift choices are likely to occur in communities. The RMCD theory seems to suggest a pattern of behavioural change in five steps that are also categorised in order of importance or acceptance until they become a habit of transport choice. Then, models such as the Normative Decision Making (NDM) looks at four stages such as attention, motivation, evaluation and decision stages. Then lastly, the comprehensive action determination model, which is very similar to NDM, introduces various choice influential stages such as intentional influences, normative influences, situational influences and habitual influences on transport mode choices.

Efforts are now being made to also integrate utilitarian factors into psychological mode choice theories (Klöckner & Friedrichsmeier, 2011). The Utility theory therefore states that people make rational decisions to maximise their interest, benefits and minimise their cost (McFadden,1974.),(Yang, 2016). As explained by Oteng-Ababio & Agyemang, as rational beings, trip-makers select among various transport alternatives, the ones which are most likely to render them the maximum utility. The utility to be derived from different transport modes is reflected in the preferences and lifestyle options that trip makers undertake (Oteng-Ababio & Agyemang, 2012).

Earlier Research Efforts

Earlier mode choice studies in Ghana including (A. M. Abane, 2011), (Poku-Boansi & Adarkwa, 2014), (Aidoo, Amoh-Gyimah, & Ackaah, 2013), (Kolawole, et al. 2014), (Agyemang, 2015) all showed that the socio-economic and

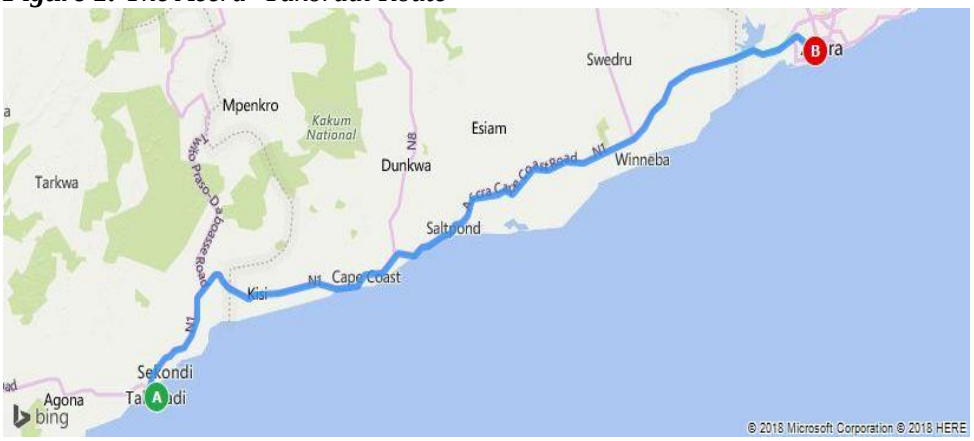
demographic status of passengers, influence their choice of transport mode. For instance, (Aidoo et al., 2013) found that the factors that are influential in determining government employee's choice of transport mode to work are individual characteristics, such as family size, educational status, income, travelling distance, and marital status. These were all found to be significant determinants of the choice of transport mode to work by government employees in the Kumasi metropolis. They further found that employees that travelled long distances from home to work had higher income and they preferred personal means of automobile transport to public transport. Their choice may have been as a result of the un-reliable, low frequency and perhaps the uncomfortable nature of public passenger transport in the geographical area (Amoh-Gyimah & Aidoo, 2013).

It is said that people's choices and concerns on transport modes are generally based on the trip purpose that needs to be fulfilled (Madhuwanthi et al.,2016). Contrary to this finding, Hensher and Prioni (2002) had earlier on found that trip purpose did not affect respondents, but personal characteristics and demographics influenced travellers choice of transport services. Even though it has been generally established that socio-economic and demographic factors of passengers greatly influence the mode choice, other factors such as the attributes of the transport service also influence their choices (Rahman et al., 2016). In various independent studies by Abane (2011), (Preston, 2012) and (Poku-Boansi & Adarkwa, 2014), it was confirmed that individual and community characteristics highly influenced transport mode choice. Interestingly, the most important characteristics that influence passenger transport modal choice in Abane's (2011) study, was the length of the journey and the purpose of the trip. This finding contradicts an earlier finding by Hensher and Prioni (2002). Abane (2011) also found that other factors of minor significance where frequency of travel, amount of luggage, seasonal variation of trips, number of stops and interference. The factors also include the comfort of passengers, reliability of service, speed of service delivery, frequency of service as well as safety and security issues. The rest are accessibility of service, the financial status of passengers and transport fares. This shows that, the factors that determine mode choice appears to be dynamic and require constant study.

This paper, therefore, aims at finding the significant transport factors and attributes that influence transport mode choice and the level of significance of each socio-economic and demographic or transport attribute on mode choice. The paper is sectioned into seven parts. After the introductory section, the study context is presented. The materials and methodology section follow, then the data analysis and results continue. Discussions and recommendation follows this stage, finally the conclusion, the limitations and prospects for future studies ends the study.

Study background and contextual issues

Figure 1: *The Accra- Takoradi Route*



Source: *Google Map, 2018*

Fig 1. Above represents the diagram of the Accra –Takoradi route. It is a linear route from the capital city of Ghana, Accra, in the Greater Accra Region, through the Central region to the capital of the Western Region of Ghana, Takoradi. The study area is located along the southern coastal part of Ghana. Accra is the capital of Ghana and the capital of the Greater Accra Region, while Sekondi- Takoradi is the capital town of the Western region. The two cities have similar geographical characteristics. Greater Accra Metropolis covers an area of approximately 173 km squared and a population of above 1,659,136 people with various cultural and ethnic backgrounds (2010 population census). The population of Sekondi - Takoradi twin city, according to 2010, Population and Housing Census, is about 445,205 people representing 23.5 percent of the region's total population. Intra-urban commuting behaviour is similar. People mostly commute using both motorised and non-motorised forms of transportation. These include walking, riding bicycles, motorcycles, use private vehicles, commercial taxis, mini-buses (Tro-tro) and bigger buses. The only two inter-urban modes of travel that link the two cities are mainly the road mode and complemented by a domestic air mode. These routes were chosen because it has educational implications as most commuters use these route to send their wards to school at pre-tertiary level. Others also use it themselves to attend higher educational institution in Winneba, Cape Coast and Takoradi.

Materials and Methods

A survey was conducted for two weeks at various bus terminals around the central hub of the route and the domestic flight terminal at Accra Airport. The random selection of respondents at the terminals before boarding vehicles enabled the researcher to get adequate inputs as they filled the designed questionnaire. With the help of SPSS software, data collected was analysed. To analyse the influence of socio-economic and demographic factors on the choice of inter-urban transport

services of travellers, a descriptive analysis of frequencies was done. A univariate and bivariate cross-tabulation analysis was later conducted on passenger's choice and evaluation of transport services. The researcher analysed data on the reasons behind the selection of a transport service or mode. The purpose for passengers' travel was compiled and transport attributes such as the comfort of passenger, availability, safety, security, frequency, accessibility and convenience were analysed together with travel purpose factors of passengers such as business, family visit, educational and social reasons.

A Multinomial Logistic Regression (MNL) analysis was performed to test the main effects of the selected independent variables being socio-economic, and mode attributes, on the dependent variable, which is transport mode. MNL analysis has been extensively used in modelling urban travel demand in earlier studies (Agyemang,2015), (Abane, 2011), (Abane, 1993), (Golledge & Gärling, 2002), (Shiftan & Ben-Akiva, 2011).

Multiple response analysis was conducted on the sample data and survey results to give more room for comments and observations. Then regression analysis was done to analyse passenger service satisfaction, affordability and customer preferences as they related to the variables. A univariate analysis was done on the data received from the field survey on most major transport operators on the route. It enabled the researcher to determine the most dominant or preferred mode or service.

A cross-tabulation univariate and bivariate analysis were later done on various variables such as passenger occupation, income and the reason for the transport service choice. Chi-square analysis were also conducted on both physical and perceived transport attributes to test and confirm statistical significance between air and road modes of travel. Various logistics regression analysis was done on socio-economic and demographic factors.

For multicollinearity to exist, the Variance Inflation Factor (VIF) should be greater than 10. After running the analysis, the VIF[1] was only 1.16 for both occupation and income, meaning there is no multicollinearity so that one could have both occupation and income variables in the models. Lastly, to know if the model fitted the data, two main categories being the measure of predictive power (R-square) and the goodness of fit tests such as Pearson chi-square test and Hosmer and Lemeshow test was conducted. The goodness of fit test was done to know if there are non-linearities or interactions. After these tests, it was found that the results satisfactory fitted the data.

[1] Variance Inflation factor is a measure of collinearity. Better when less than 10.

Study results and discussions

Table 1: *Overview of survey respondents*

Variables/ Description	Frequency	Valid Percent	Age Range	Frequency	Valid Percent
Gender			**10-19 years**	6	0.8
Male	517	66.1	**20-30 years**	200	25.6
Female	266	33.9	**31-40 years**	362	46.2
			41-50 years	165	21.0
			51-60 years	34	4.4
			61 and above	16	2.0
Total	**783**	**100.0**	**Total**	**783**	**100.0**

Source: *Field Data 2018*

From the total valid passengers, 66.1 % were male, and 33.9% were female. The table shows passengers categorised by age ranges. The three highest age ranges from the data were first, the passengers between 31-40 years were 46%. Secondly, passengers between 20-30 were 25.6% and lastly, passengers between 41-50 years were 21%.

Table 2: *Cross tabulation of passengers' occupation and income*

Passengers Skills Categorization	Frequency	Valid Percent		Up to GHC 2000	GHC 2001 to GHC 4000	Above GHC 4000	Total
			Count	97	8	4	**109**
Unemployed	109	14.4	% within Occupation	**89.3%**	**7.1%**	**3.6%**	**100.0%**
			Count	98	8	4	**110**
Low skilled	110	14.6	% within Occupation	**88.7%**	**7.5%**	**3.8%**	**100.0%**
			Count	185	22	9	**216**
Semi-Skilled	216	28.6	% within Occupation	**85.6%**	**10.4%**	**4.0%**	**100.0%**
			Count	142	101	78	**321**
High- Skilled	321	42.5	% within Occupation	**44.3%**	**31.3%**	**24.3%**	**100.0%**

			Count	522	139	95	756
T O T A L	**756**	**100.0**	**T O T A L**	**66.8%**	**19.7%**	**13.5%**	**100.0%**
No responses	27						
T O T A L	**783**	**100.0**					

Source: *Field Data 2018*

Chi-square Test			
	Value	**Df**	**Asymptotic significance (2-sided)**
Pearson Chi-Square	131.456a	**6**	0.000
Likelihood Ratio	138.729	**6**	0.000
Linear-by-Linear Association	90.282	**1**	0.000
No of Valid Cases	**756**		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 3.79.

Source: *Field Data 2018*

While Table 1., shows the valid passengers by gender, Table 2: Shows the re-categorisation of passengers into four general groups being unemployed which were 13.9%, low skilled workers 14%, semi-skilled 27% and highly skilled 41% of the sample size. Unemployed refers to students and people who are not gainfully employed and may not earn a regular income. All the various occupations were re-categorised based on the Statistical Service of Ghana categorisation to reduce errors in the analysis.

In testing the relationship between income and occupation, the result in table 2: showed the observed and expected counts of individuals under the categories of occupation and income. The table above showed the Chi-Square test result of 131.4 and D.f [2] of 6. The likelihood ratio test is interpreted similarly to the chi-square test. At a significance level of 0.05, the p-valves[3] of these were calculated. The Pearson Chi-square tested the value of the row and column variables in the table. It showed that the variables are independent of each other. The asymptotic significance value from the table is 0.0. It is known that the lower the asymptotic significance value, the less likely it is that the two variables are independent and would cause one to reject the null hypothesis of no relationship. The output of the tests suggests that income and occupation are not related (i.e., they are independent) since the significance level of the Pearson Chi-Square test is above the usual cut-off point of 0.05.

Table 3: *Air & Road transport services selected by passengers along the route*

Transport Operator	**Frequency**	**Percentage %**
******Africa World Airline**	132	16.86
Adjawa Station	3	0.38
Cooperative transport	107	13.67
Ford Minibus	69	8.81
Gedah Minibuses	2	0.26
GPRTU	95	12.13
Metro Mass Transit	176	22.48
State Transport Co.	123	15.71
Stanbic Minibus	76	9.71
TOTAL	**783**	**100**

Source: *Field Data 2018*

**Note: As at the time of the survey, Africa World Airline (AWA) was the only domestic airline service operating on the Accra-Takoradi route. Antrak Air and Starbow Air had ceased operation. Unity Air and Passion Air had not started operating on the route.*

[2] D.f (Degree of Freedom): Tells how many numbers in a research grid are independent. Degree of freedom = (r-1) (c-1) where r is the number of row and c, the number of columns.
[3] P-value: Measures significance of the results. It is between 0-1. A value (typically more or equal to 0.05) indicates strong evidence against the null hypothesis and may be rejected.

Table 3: Shows the frequency and percentage of passengers' patronage of transport service along the route. The Government-owned operators which are Metro Mass Transit and Inter-City State Transport Company had a percentage of 22.48 % and 15.71% passengers respectively. Therefore, Government-owned operators had a total percentage of 38.19% of patronage. The mini-bus operators made up of Stanbic, Gedah, Ford, and Adjawa all together had a percentage of 19.16% patronage, and the big privately own buses made up of GPRTU, Cooperative transport had percentage patronage of 25.80%. The only airline operator at the time of this survey was Africa World Airline, and it had a 16.86% patronage.

Table 4: *Distribution of respondents by their reason and purpose of travel, along the Accra-Takoradi Route (multiple responses).*

	Responses			**Responses**	
Reasons for transport service choice	N	Percent	**Purpose of Travel**	N	Percent
Available	268	14.8%	Only Social	147	17.4%
Comfortable	301	16.6%	Education	73	8.7%
Accessible	142	7.9%	Religious	23	2.7%
Affordable	190	10.5%	Business	424	50.3%
Convenience	296	16.4%	Leisure	39	4.6%
Safe	381	21.1%	Shopping	5	0.6%
Quality Service	17	0.9%	Extended Family Visit	104	12.3%
Security	73	4.0%	Funeral	12	1.4%
Faster	136	7.5%	Health	2	0.2%
Other reasons	4	0.2%	Residential Purpose	14	1.7%
Total	**1808**	**100.0%**	**Total**	**843**	**100.0%**

Source: *Field Data, 2018.*

The reasons for the selection of transport services or mode were differentiated from the purpose of their trip. This distinction had to be made because the reasons for the choice of transport service, are operationally explained as mainly the characteristics of the transport service that appeals to travellers the most. it is mostly based on the characteristics of the vehicle such as physical or perceived

attributes. However, the purpose of their trip or travel is explained as the aim, objective or intention for the trip by the passenger. It answers the question, why the trip was taken.

As illustrated in Table 3, as many as 50.3 % stated the trip was for business purposes, 17.4% stated it was for only social purposes, while 12.3 % stated it was to visit extended family members and 8.7% was for educational purposes. The rest was for other purposes such as 2.7% religious, 1.40% funeral, 0.20% health and 4.6% for leisure purposes. The reasons for the choice of transport services was generally based on safety (21%), comfort (16.6%), convenience (16.4%), affordability (10.5%), accessibility (7.9%), and speed of service (7.5%). There were other reasons such as terminal condition and conduct of terminal staff, the distance between the point of origin and destination to terminals and suitability and convenience of carrying luggage that scored as low (0.2%) but cannot be ignored.

Bivariate analysis of the reasons for the choice of modes (Multiple Choice)

Table 5: *Multiple choice responses on reasons for choice of transport mode (inter-urban travel)*

		Reasons for Transport Service choice										
Mode		**Available**	**Comfortable**	**Accessible**	**Affordable**	**Convenience**	**Safe**	**Quality**	**Security**	**Faster**	**Other**	**Total**
Road & Air Travel	Road	230	275	128	172	245	351	10	64	98	3	**646**
		35.0 %	**42.6 %**	**19.8 %**	**26.6 %**	**37.9 %**	**54.3 %**	**1.5 %**	**9.9%**	**15.2 %**	**0.5 %**	
	Air	38	26	14	18	51	30	7	9	38	1	**125**
		30.4 %	**20.8 %**	**11.2 %**	**14.4 %**	**40.8 %**	**24.0 %**	**5.6 %**	**7.2%**	**30.4 %**	**0.8 %**	
Total		**268**	**301**	**142**	**190**	**296**	**381**	**17**	**73**	**136**	**4**	**771**
Average % between both modes		**33.0 %**	**31.7 %**	**15.5 %**	**20.5 %**	**39.35 %**	**39.15%**	**3.55 %**	**8.55%**	**22.8 %**	**0.65 %**	

Source: *Field Data 2018*

As seen in Table 4, The bivariate analysis of the two modes showed that on the average comparing both modes, 39.35% of respondents mainly chose the transport service because of convenience. Safety and availability reasons followed with

results of 37.9% for the road mode and 40.8% for the air mode and 35% for road and 30.4% for air mode respectfully.

Table 6: *Summary evaluations of physical transport attributes*

MODES	NAME OF ATTRIBUTE	GENERAL EVALUATION	HIGHEST PERCENTAGE SCORE	TYPE OF ATTRIBUTE	P-VALUE/ Chi-Square	REMARKS
Road	**Frequency**	Good	464 (71.7%)	**Physical Attribute**	***** Chi-Square= 1.85**	**Not statistically significant**
Air	**Frequency**	Good	98 (74.9%)		**p value = 0.553**	
Road	**Traffic Congestion**	Normal	284 (43.8%)	**Physical Attribute**	**Chi-Square= 6.311**	**statistically significant**
Air	**Traffic Congestion**	Normal	42 (32.8%)		**p value = 0.043**	
Road	**Speed**	Good	382 (58.8%)	**Physical Attribute**	***Chi-Square= 4.440**	**Not statistically significant**
Air	**Speed**	Good	87 (66.9%)		**p value = 0.109**	
Road	**Environmental pollution**	Normal	235 (36.3%)	**Physical Attribute**	**Chi-Square= 49.554**	**statistically significant**
Air	**Environmental pollution**	Good	77 (59.3%)		**p value = 0.000**	
Road	**Staff Conduct**	Good	436 (67.1%)	**Physical Attribute**	**Chi-Square= 11.015**	**statistically significant**
Air	**Staff Conduct**	Good	105 (80.1%)		**p value = 0.004**	
Road	**Cleanliness**	Good	486 (74.8%)	**Physical Attribute**	*****Chi-Square= 0.294**	**Not statistically significant**
Air	**Cleanliness**	Good	99 (75.6%)		**p value = 0.863**	

Road	**Terminal Organization**	Good	281 (43.5%)	**Physical Attribute**	**Chi-Square= 28.20**	**statistically significant**
Air	**Terminal Organization**	Good	78 (59.6%)		**p value = 0.000**	
Road	**Availability**	Good	466 (71.9%)	**Physical Attribute**	**Chi-Square= 12.317**	**statistically significant**
Air	**Availability**	Good	79 (60.3%)		**p value = 0.002**	
Road	***Accessibility**	Good	436 (67.2%)	***Physical Attribute**	***Chi-Square= 4.109**	**Not statistically significant**
Air	**Accessibility**	Good	88 (67.2%0		**P value = 0.128**	

Source: *Field Data 2018*

In table 6: nine (9) physical attributes were evaluated by passengers on both the air and road modes. From the analysis, the statistically significant physical attributes for both air and road modes were; traffic congestion, environmental pollution, staff conduct, transport service availability and general terminal organisation. On the other hand, the statistically significant perceived attributes for both air and road modes were; overall satisfaction, service quality, safety, comfort, affordability, security, general satisfaction.

Table 7: *Summary evaluations of perceived transport attributes*

MODES	NAME OF ATTRIBUTE	GENERAL EVALUATION	HIGHEST PERCENTAGE SCORE	TYPE OF ATTRIBUTE	P-VALUE/ Chi-Square	REMARKS
Road	**Satisfaction**	Good	417 (64.2%)	**Perceived Attribute**	**Chi-Square= 9.081**	**Statistically significant**
Air	**Satisfaction**	Good	100 (76.4%)		**p value = 0.011**	
Road	**Service Quality**	Good	408 (63.0%)	**Perceived Attribute**	***Chi-Square= 2.827	**Not Statistically significant**
Air	**Service Quality**	Good	91 (69.5%)		**p value = 0.243**	
Road	**Safety**	Good	427 (65.9%)	**Perceived Attribute**	**Chi-Square= 10.774**	**Statistically significant**
Air	**Safety**	Good	101 (77.1%)		**p value = 0.005**	
Road	**Security**	Good	369 (56.9%)	**Perceived Attribute**	**Chi-Square= 17.073**	**Statistically significant**
Air	**Security**	Good	99 (75.6%)		**p value = 0.000**	
Road	**Convenience**	Good	365 (56.4%)	**Perceived Attribute**	***Chi-Square= 3.904	**Not statistically significant**
Air	**Convenience**	Good	83 (63.4%)		**p-value = 0.142**	

Road	**Affordability**	Normal	303 (47.0%)	**Perceived Attribute**	**Chi-Square= 19.885**	**Statistically significant**
Air	**Affordability**	Normal	52 (39.7%)			
					P value = 0.000	
Road	**Comfort**	Good	451 (69.5%)	**Perceived Attribute**	**Chi-Square= 10.257**	**Statistically significant**
Air	**Comfort**	Good	102 (77.9%)			
					p value = 0.006	

Source: *Field Data 2018.*

Table 7: shows the evaluation and analysis of seven (7) transport service attributes. The evaluation of transport service showed attributes such as affordability, availability, terminal organisation, safety, security, staff conduct, general satisfaction, environmental pollution, comfort, and traffic congestion were each statistically significant. However, attributes such as frequency, accessibility, convenience, overall service quality, cleanliness, speed of service, were each not statistically significant. The Chi-square results of the attributes such as cleanliness 0.29, frequency 1.85, service quality 2.8 and convenience 3.9, showed that the observed data fitted the expected data very well. There was, therefore, a high correlation between the two data variables and a good relationship.

Table 8: *Models on transport mode choice determinants*

Variables	**Model 1**				**Model 2**			
	Sig.	Exp(B)	95% Confidence Interval for EXP (B)		Sig.	Exp(B)	95% Confidence Interval for EXP(B)	
			Lower	Upper			Lower	Upper
Gender								
Male (RF)	-				-			
Female	**0.098**	2.103	0.872	5.074	**0.059**	2.372	0.967	5.814
Age								
20-30 years (RF)	-				-			
31-40 years	**0.728**	0.830	0.291	2.370	**0.615**	0.758	0.257	2.235

41-50 years	**0.182**	0.461	0.148	1.437	**0.173**	0.445	0.139	1.425
51 years and above	**0.321**	0.467	0.104	2.102	**0.332**	0.470	0.102	2.161
Income								
up to 2000 GHC (RF)	-				-			
GHC 2001 to 4000	**0.000**	0.164	0.062	0.436	**0.000**	0.158	0.060	0.418
GHC 4001 and above	**0.000**	0.008	0.003	0.023	**0.000**	0.008	0.003	0.024
Profession								
Other professions (RF)	-				-			
Unemployed	**0.198**	0.104	0.003	3.259	**0.097**	0.063	0.002	1.645
Manager	**0.009**	0.040	0.004	0.444	**0.009**	0.038	0.003	0.436
Professionals	**0.007**	0.039	0.004	0.405	**0.007**	0.039	0.004	0.419
Technicians and associate professionals	**0.004**	0.022	0.002	0.289	**0.004**	0.021	0.002	0.280
Clerical support workers	**0.016**	0.036	0.002	0.536	**0.023**	0.041	0.003	0.642
Service and sales workers	**0.675**	0.513	0.023	11.611	**0.622**	0.454	0.020	10.447
Craft and related trades	**0.112**	0.098	0.006	1.726	**0.128**	0.102	0.005	1.930
Retired	**0.007**	0.025	0.002	0.370	**0.009**	0.026	0.002	0.410
Physical attribute					**0.775**	0.982	0.865	1.114
Perceived attribute					**0.110**	0.893	0.778	1.026
Constant	**0.000**	864.090			**0.000**	4869.616		

Source: *Field Data 2018*

RF[4] **– Reference category** **Number of cases 610**

[4] Reference categories selected were:
For gender – Male, For Age – 20-30 years, for Income – up to GHC 2,000. for professions - Other professions,

Model 1: R square 0.632 Chi-square 0.000 Classification table Overall percentage 93.1 %
Model 2: R square 0.642 Chi-square 0.000 Classification table Overall percentage 93.3 %

Reference to table 8, two models were initially developed from the data. Model 1 was done using variables such as gender, age, income, and profession. The test of model fitness was done for Model 1. It showed that model has a chi-square result of 0.00, which is significant. It, therefore, indicates that the model fits the data. Secondly, overall, Model 1 explains from the Nagelkerke R-square result that the demographic and socio-economic variables explain 63% of the variables in the choice of transport mode.

While income and profession were significant predictors of the choice of transport mode, age, and gender were not significant. A significant finding is that as income of respondent rise, their preference for air mode is increased. For instance, the income of passengers between GHC 2001- GHC 4,000 and above were more likely to choose air transport modes to road transport as compared to passengers with incomes below GHC 2000.

The second model was developed using variables such as gender, age, income, profession, the physical and perceived attributes. The test of model fitness was done, and it showed that the model had a chi-square result of 0.00, which is significant. It, therefore, indicates that the model fits the data. Results showed that while income and profession were significant predictors of the choice of transport mode, age, gender, and physical attributes were not significant. From Model 2, the income of passengers between GHC 4001 and above are less likely to choose road transport modes to air transport as compared to passengers with incomes below GHC 2000. The new model had a significantly reduced -2LL compared to the baseline model. It suggested that the new model is explaining more of the variances in the outcome, and it showed that the new model was an improvement. The overall, Model 2 explains from the Nagelkerke R Square result that 64% of the variables in the choice of transport mode are explained by the demographic, socio-economic, the perceived and physical variables.
A third model was developed using income, occupation and distances from terminal to origin and destinations.

Table 9: *Summary of travel distances from origin to terminals and terminals to final destinations.*

Distance Ranges **Origin to Accra Terminals**	**Frequency**	**Percentage**	**Distance Ranges** **Takoradi Terminals to Destination**	**Frequency**	**Percentage**
0-30km	713	91.06	0-30km	636	81.23
30.1km-60km	46	05.87	30.1km-60km	29	03.70
60.1-80+ km	24	03.07	60.1-80+ km	118	15.07
TOTAL	**783**	**100.00**		**783**	**100.00**

Source: Field Data 2018

Table 10: *Model on only the significant variables i.e. Distance, Income and Occupation*

Model 3: Logistics Regression on only Distance, Income and Occupation

Variables (Road)	**Coeffic.** (A)	**Std. Error** (B)	**Z-Value** (A)/ (B)	**Odds Ratio**	**P-Value**	**95% Confidence Interval Lower**	**95% Confidence Interval Upper**
Distance from Origin to Terminals (Accra)							
0 - 30km	RF						
30.1 - 60km	- 0.063	0.708	-0.09	0.939	**0.930**	0.234	3.766
60.1 - 80+km	-1.756	0.819	-2.14	0.173	**0.032**	0.0345	0.861
Distance. From Terminals (Tadi) to Destinations							
0 - 30km	RF						
30.1 - 60km	-1.198	0.827	-1.45	0.302	**0.147**	0.0596	1.526
60.1 - 80+km	0.313	0.530	0.59	1.368	**0.555**	0.484	3.866
Income							

Up to GHC 2,000	RF						
GHC 2,000 - GHC4,000.	-1.893	0.464	-4.07	0.151	**0.000**	0.0605	0.374
Above GHC 4,000.	-5.144	0.488	-10.53	0.00583	**0.000**	0.00224	0.0152
Occupation (skill level)							
Unemployed	RF						
Low-skilled	-0.987	1.372	-0.72	0.373	**0.472**	0.0253	5.486
Semi-Skilled	0.321	1.361	0.24	1.379	**0.813**	0.0956	19.88
Highly Skilled	-1.239	1.298	-0.95	0.290	**0.340**	0.0228	3.687

Source: *Field Data 2018*

RF – Reference category **Number of cases 630**
Model 3: R square 0.520 Chi-square 0.000 Log likelihood = -130.65
Exponentiated coefficients: 95% confidence intervals. *p< 0.05, **p<0.01, ***p<0.001

Reference to Table 10, the third model represented the regression analysis on three significant variables in the earlier analysis, being distance, income and occupation. The test of model fitness was done for Model, 3. It showed that model has a chi-square result of 0.00, which is significant. It, therefore, indicates that the model fits the data. Secondly, overall, model 3 explains from the Pseudo R-squared result that 52% of the variables in the choice of transport mode is explained by the distance, income and the occupation variables.

While income and distance were significant predictors of the choice of transport mode, occupation was not statistically significant. From Table 10, (model 3) Persons who travelled between 60.1 – 80+km from place of origin to Accra /Kaneshie transport terminal were less likely to travel by road to Takoradi. Also, persons with income between GHC 2001 to GHC 4,000 and above GHC 4,000 are less likely to travel by road.

Conclusions and Recommendation

Various transport theories have proposed reasons for the selection of a particular transport service or mode. From the study, several factors influenced the choice of transport mode. They include a combination of factors such as transport attributes, the reason or purpose of travel, travellers evaluation of the service and distances from origin and destination to the transport terminals. Even though in general the choice of transport mode and services by travelers could be ranked in order of influence, choice determining factors are varied, and they include several factors

in order of importance such as convenience, safety reasons, transport availability, comfort, speed of travel, and affordability. Other important reasons for selecting transport services include accessibility and security reasons. As tested by Abane, (2011), Agyemang, (2015), the researcher also tested the socio-economic and demographic factors and how they influence transport mode choice. The results confirmed that indeed, the socio-economic and demographic characteristics of passengers influenced the choice of transport service or mode of travel.

The study also showed that both perceived and physical attributes of vehicles influenced the choice of transport modes. However, the influence of the physical attributes was not statistically significant. Also, while income and profession were significant predictors of the choice of transport modes, age, gender, and the physical transport attributes were not significant. Secondly, overall, model 3 explains from the Pseudo R-squared result that 52% of the variables in the choice of transport mode is explained by the distance, income and the occupation variables. Therefore, while income and distance were significant predictors of the choice of transport mode, occupation was not statistically significant. Persons who travelled between 60.1 – 80+km from place of origin to Accra /Kaneshie transport terminal were less likely to travel by road to Takoradi. Also, persons with income between GHC 2001 to GHC 4,000 and above GHC 4,000 are less likely to travel by road.

Practically, it is recommended that operators of air transport need to consider improvements of many factors seriously. These factors include the inconvenience of travellers at the airports, improvement of time spent travelling by reducing waiting times at airports before take-off, increase service availability by increasing their presence and more services on domestic routes, sustain the high safety standards and improve travellers comfort especially at the waiting terminals before the flight takes off.

Road operators, on the other hand, need to consider seriously in order of importance, the comfort of passengers in the buses and at the terminals before embarking on the trips. There is a need for the continued availability of more buses to improve on the frequency and reduce waiting time at the terminals. To ensure passengers earn value for their money, there is the need to make the fares competitive and affordable and the introduction of more customer-oriented services. Finally, there is the need for improvement in inter-city travel accessibility by improving the location of terminals and ticketing systems by introducing modern advance ticketing, discounts and use of ICT methods such as mobile money for fare payment.

Limitations and prospects for future studies

The present study focused attention on socio-economic and democratic factors as well as transport physical and perceived attributes that influence the choice of transport modes or services. The study was conducted mainly in the Greater - Accra region and could be extended to other parts of the country. In the light of these earlier studies, and against the backdrop of findings made in this present

study, it is highly recommended that future studies explore from the operators' perspective, factors and inputs that will improve the efficiency and operation of transport services.

Future studies may be conducted to analyse passengers' satisfaction level and loyalty towards public transport services on the same route. Future studies may be conducted on the level of service measurement and analysis of transport modes and analysis of the elasticity and impact of travel time on the choice of transport modes.

Implications for Policy and Practice

The implications for policy is that, the outcome of this paper may assist organisations especially institutions of higher learning to have a travelling policy to guide their operations to minimise cost to parents and the students. In respect of practice, the research findings will guide in selecting appropriate transportation mode to ensure effective planning of business operations.

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