

On the Motivations and Challenges Faced by Commuters Using Bus Rapid Transit in Lagos, Nigeria

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Abstract: There are no much sex differences in the distribution of challenges faced by commuters using Bus Rapid Transit (BRT) as observed from this survey. Internal consistencies tests showed that the responses are randomized. Price charged, non-availability of buses and security in the buses are paramount challenges faced by the commuters. The moderation results showed that the commuters' satisfaction in patronizing the BRT are mostly affected by security of the buses, reduced commuting time, attitude of the staffs, the attitude of the staff as seen in the behavior of the drivers, the prices charged as it affect the income of the commuters and the present available routes. Adequate security at the buses and bus stops, availability of more buses, downward review of the prices charged and increase in the available routes are some recommendations that can help to address the challenges faced by commuters using BRT especially as a means of conveying them to their workplaces.

Key words: Bus rapid transit, challenges, crosses tabulation, reliability analysis, correspondence analysis, correlation, regression, moderation

INTRODUCTION

Lagos State, Nigeria, being one of the fastest growing cities in the world is faced by numerous challenges of which efficient and adequate transportation is one of them. Census 2006 showed that Lagos has an estimated population of 17 million but most of the total population is clustered around a relatively small geographical space (Bramoh and Onishi, 2007) thereby causing a great strain on the existing public infrastructure (Odufuwa, 2010).

Mobereola (2009) in his SSATP discussion paper presentation stated that in order to address some of the problems of public transportation in Lagos, the state government on 17th March, 2008, introduced Bus Rapid Transit (BRT) which according to the paper presenter was to provide Lagos and environs, a more convenient and reliable means of commuting around the city. The introduction of BRT was widely accepted by the commuters and had helped to address the menace of uncoordinated and uncontrolled public transport business in the state. BRT runs a dedicated routes and at a faster rate.

Globally numerous researchers have researched on challenges faced by commuters in the public transport and some of the literature also applied on the BRT and the Nigerian context. Some of the general challenges faced by commuters in Nigeria were highlighted by Ali (2010), Basorun and Rotowa (2012) and Osuji and Onyenechere (2013) but the scope of their study was limited in

geographical size while Aidoo *et al.* (2013) limited their study to safety and on Kumasi-Accra route. Sharaby and Shiftan (2012) looked at the relationship between fare integration and the commuters travel behaviour. Also, it is very important to have a clearly defined service contracts in public transports (Marcucci and Gatta, 2007). Generally, mass transit for example BRT management also requires adequate land development policy (Deng and Nelson, 2010). Ensuring quality service delivery is very essential in effective management of public transport (Eboli and Mazzula, 2007; Awasthi *et al.*, 2011; McDonnell and Zellner, 2011).

Congestion and excessive pressure on the Nigerian roads were identified earlier to be the main problems of road transportation in Nigeria (Adedamila, 1981; Adenle, 1977; Olayemi, 1977; Ogunsanya, 1984; Aderamo, 1998). Bad roads can also be a barrier to efficient public transport (Basorun, 2005; Ogunbodede, 2008; Aderamo, 2010). The effects of bad roads, overcrowding and dearth of investments on the infrastructure had contributed to a disjointed public transport in Nigeria (Wright, 1994; Ogwude, 2011). Aderamo (2012) attributed challenges faced on public transport on mainly poor urban planning. Many socio-economic variables can determine commuters satisfaction in using BRT in Lagos (Adebambo and Adebayo, 2009; Odufuwa *et al.*, 2012) while high transport fare can discourage commuters from using BRT (Ugo, 2014).

MATERIALS AND METHODS

The research objectives are as follows:

- Examine sex differences in the response to the questions in the questionnaires
- Examine the purposes differences in the response to the questionnaires
- Highlighting the key issues raised by the respondents that need attention
- Checking the internal consistencies of the responses
- Using correspondence analysis to determine the randomness of the responses
- Using multiple linear regression to determine how the challenges raised by the respondents are related
- Using moderated multiple regression to determine how the challenges raised by the respondents are related

A simple random sampling was adopted and used to collect the data from a short self-rated questionnaire. The small size of questions was necessary to solicit responses from commuters within a relatively short time intervals. The questionnaires were distributed randomly irrespective of the sex (gender) of the respondents and also irrespective of the purpose. Only children were excluded from the survey. The survey was carried out from Monday to Friday during rush and normal hours. No extra explanations were given to the questions to avoid the introduction of biases. About 1853 responded and exactly 1800 was used for the final analysis. About 53 was excluded because of incomplete responses or missing values. The sample size is adequate especially when the target population is homogenous; in this case, the commuters or passengers views may not necessary be divergent. The questionnaire contains 17 questions with five choices of responses which are: Strongly Agree (SA), Agree (A), Not Sure (NS), Disagree (D) and Strongly Disagree (SD). The questions and the statement codes are shown in Table 1.

Table 1: The questions in the questionnaires

Codes	Questions
Q1	The prices charged are affordable
Q2	The BRT is always overcrowded
Q3	The tickets are always readily available and accessible
Q4	BRT is always available
Q5	The roads are in good condition
Q6	Staff respond well to complaints
Q7	BRT buses have helped reduce commuting time and stress
Q8	The buses are secure
Q9	Regular use of BRT has little significant effect on income
Q10	The buses are neat and quality of seats is good
Q11	Security is adequate at the bus stops
Q12	BRT has helped to reduce traffic congestion in the city
Q13	The current routes plies by BRT are adequate
Q14	The drivers are disciplined and well behaved
Q15	BRT offers more value for money than others
Q16	Drivers drive moderately and obey traffic regulations
Q17	I always enjoyed using BRT

RESULTS AND DISCUSSION

Cross tabulation: About 934 (51.9%) of the respondents were male and 866 (48.1%) were female. The 1239 (68.89%) of the respondents believed that their purpose of using BRT is to convey them to their respective workplaces while 423 (23.5%) use BRT for business, appointments or to convey goods. However, only 138 (7.7%) have other reasons of using BRT. Those reasons can be school, markets, visiting friends, running errands, etc.

In summary, the responses from both sexes are almost the same with respect to the questions with slight variations. This is also the same case for the purpose of using BRT.

Reliability analysis: The rating parameter used was a Likert five-point scale and the assigned values are as follows strongly agree = 1, agree = 2, not sure = 3, disagree = 4 and strongly disagree = 5. With the cut-off point as 3, from Table 2, it can be seen that those questions that are below the mean of 3 are areas that indicates commuter satisfaction and less challenging. However, those questions that is above the cut-off point of 3 calls for concern and attention as it indicates commuter dissatisfaction. The Cronbach’s alpha is 0.709 which is a measure of internal consistencies which is desirable as it is closer to 1 and hence, a test of reliability of dichotomously or polytomously scored items in the item response theory (Almehrizi, 2013).

Guttman Lambda scale of 0.667, 0.737, 0.709, 0.791, 0.712, 0.777 also indicates an acceptable split-half reliability. The Guttman scale indicate the level and sensitivity of the interval consistencies of the items in the scale (Van Schuur, 2003).

Correspondence analysis: This statistical method can be used to explore the randomness of the response patterns of the respondents in dimensions.

From Table 3, the correspondence analysis was able to account for only about 36% of the total variance but the high Chi-square value showed that the model is highly significant while dimension one accounts to 73.7% of the variance and dimension two accounts to 13.2 of the variance. The results from the correspondence the exploratory and it showed results similar to cross tabulation.

Correlation and statistical significance: It is known that a result is said to be statistically significant if it can lead to the rejection of the null hypothesis and the smaller the p-value, the larger the significance. However, the null hypothesis is accepted when p-value is greater than the

Table 2: Distribution of responses to the challenges faced by commuters on BRT Lagos responses from the question statements

Questions	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	Mean	SD
Q1	54	96	80	409	1161	4.4039	1.00509
Q2	462	674	85	303	276	2.5872	1.41898
Q3	406	482	363	331	218	2.7072	1.75400
Q4	228	261	242	533	536	3.4933	1.37716
Q5	581	541	290	266	122	2.3372	1.25386
Q6	455	406	504	258	177	2.6089	1.27329
Q7	1209	445	56	72	18	1.4694	0.81955
Q8	448	227	154	696	275	3.0683	1.45463
Q9	109	223	269	471	728	3.8256	1.25095
Q10	302	298	303	479	418	3.2294	1.40717
Q11	135	284	276	476	627	3.6533	1.29987
Q12	530	773	157	198	142	2.2494	1.21254
Q13	74	191	197	643	695	3.9411	1.13457
Q14	489	472	370	242	227	2.5811	1.34659
Q15	697	450	391	195	67	2.1583	1.16123
Q16	396	471	426	291	216	2.7000	1.30164
Q17	452	676	315	311	46	2.3461	1.10820

Table 3: The summary of the inertia of the correspondence analysis

Dimension	Singular value	Inertia ^b	χ^2 -value	Sig.	Proportion of inertia		Confidences singular value			
					Accounted for	Cumulative	Correlation			
1	0.512	0.262	-	-	0.737	0.737	0.004	0.245	0.091	0.119
2	0.217	0.047	-	-	0.132	0.869	0.005	-	0.127	0.110
3	0.159	0.025	-	-	0.071	0.940	0.006	-	-	0.274
4	0.147	0.021	-	-	0.060	1.000	0.006	-	-	-
Total	-	0.356	10895.07	0.000 ^a	1.000	1.000	-	-	-	-

^a64 degrees of freedom; ^bInertia of variance

significance level of the test. For this research, the significance level is 0.05. Irrespective of the correlation coefficients of the pairs of questions (Q1-Q17), 83 pairs of questions are statistically significant while 53 pairs of the questions are statistically insignificant, correlation notwithstanding. The 53 pairs of the statistically insignificant questions are listed as follows: (1, 2), (1, 7), (1, 8), (1, 10), (1, 12), (1, 14), (1, 15), (1, 16), (1, 17), (2, 4), (2, 7), (2, 9), (2, 11), (2, 13), (3, 7), (3, 9), (3, 11), (4, 5), (4, 6), (4, 7), (4, 8), (4, 10), (4, 12), (4, 14), (4, 15), (4, 16), (4, 17), (5, 9), (5, 11), (5, 13), (7, 9), (7, 13), (8, 9), (8, 11), (8, 13), (9, 10), (9, 12), (9, 14), (9, 15), (9, 16), (9, 17), (10, 11), (11, 12), (11, 14), (11, 15), (11, 16), (11, 17), (12, 13), (13, 14), (13, 15), (13, 16), (13, 17).

For example (1, 2) can be interpreted as the price charged is independent of the overcrowded state of the bus and so on.

The pairs are mutually exclusive and collectively exhaustive. Some of the pairs of questions that are statistically significant are (1, 3), (1, 4), (1, 5), (1, 6), (1, 9), etc. For example (1, 3) can be interpreted as the price charged is dependent on the availability of buses.

Multiple regression: The regression analysis revealed how the overall commuters' satisfaction (Q17) is dependent on the challenges (Q1-16). The results are

Table 4: The model fit for the regression

Regression	Model
R	0.786
R ²	0.618
Adj. R ²	0.615
F-value	180.628
Sig.	0.000

Table 5: The coefficients of the variables for the regression model

Variables	Coefficient	Variables	Coefficient	Variables	Coefficient
Q1	-0.002	Q7	0.185	Q13	0.016
Q2	0.023	Q8	0.607	Q14	0.118
Q3	0.006	Q9	-0.011	Q15	-0.033
Q4	0.026	Q10	-0.013	Q16	0.017
Q5	0.002	Q11	-0.020		
Q6	0.181	Q12	0.018		

Constant: -0.163

summarized as follows: the regression was able to account for about 62% of the variance and there is a relationship or association between the dependent variable and independent variables (Table 4 and 5).

Moderated multiple regression: Sometimes, the independent variables may depend on each other resulting to variable interactions and the dependent variable can be predicted by both the independent variables and the interactions (Irwin and McClelland, 2001).

In these research questions (Q9-16) are moderating variables for questions (Q1-Q8). Table 6 and 7 shows the

Table 6: Independent variables and their corresponding moderating variables

Independent variables	Moderating variables
Q1	Q9
Q2	Q10
Q3	Q11
Q4	Q12
Q5	Q13
Q6	Q14
Q7	Q15
Q8	Q16

Table 7: The coefficients of the variables and interactions for the Moderated Regression Model

Variables	Coefficient	Variables	Coefficient	Variables	Coefficient
Q1	0.000	Q10	-0.054	Q3Q11	0.047
Q2	0.016	Q11	-0.055	Q4Q12	-0.061
Q3	0.015	Q12	0.074	Q5Q13	-0.086
Q4	0.024	Q13	0.098	Q6Q14	0.149
Q5	-0.006	Q14	-0.018	Q7Q15	-0.033
Q6	0.177	Q15	0.004	Q8Q16	0.007
Q7	0.197	Q16	0.007		
Q8	0.605	Q1Q9	0.132		
Q9	-0.140	Q2Q10	0.054		

Constant: 0.253

independent variables and their corresponding moderating variables: there are no much sex differences in the distribution of challenges faced by commuters on BRT buses in Lagos (Fig. 1).

Analysis of the data showed that most commuters patronize BRT for conveying them to their workplaces. Also there are no much purpose differences in the distribution of challenges faced by commuters using BRT (Fig. 2).

The commuters are most challenged by the unaffordability of prices charged, non-availability of buses, security in the buses, the effect of prices charged on their income, low quality of the seats, the insecurity at the bus stops and they are frustrated with the limited routes covered by the BRT.

The measure of the internal consistencies and its sensitivity are desirable. There is an appreciable level of randomness of the questions and the responses as revealed by the correspondence analysis (Fig. 3).

From the results of multiple regression analysis, the effect on the convenience and comfort ability of using BRT are ranked from the highest to the least: the security in the buses, reduction of commuting time, attitude of staff towards commuters, the behaviour of the drivers, the availability of buses, the compactness and overcrowding of buses, reduction of traffic congestion, the drivers' compliance to traffic regulations, the available routes, the availability of tickets, the conditions of the roads, commuters perceptions on the prices charged, the effect of prices charged on income of commuters, the quality of seats, the security at the bus stops and value for money. That is security of buses is paramount challenge faced by

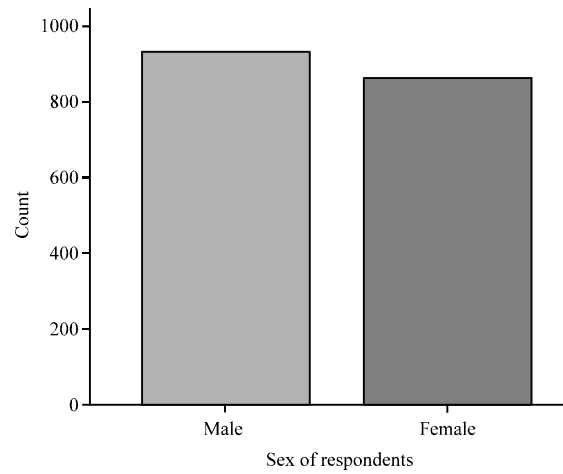


Fig. 1: Sex of respondents

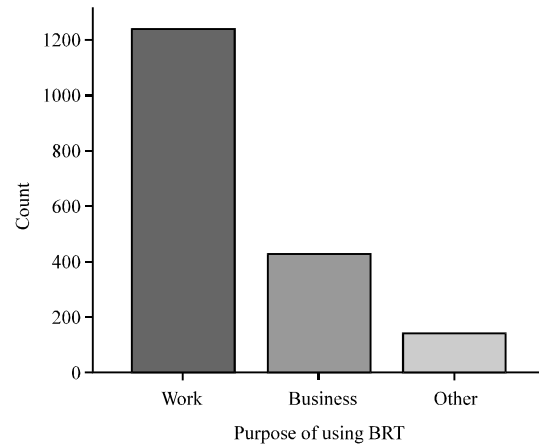


Fig. 2: Purpose of using BRT

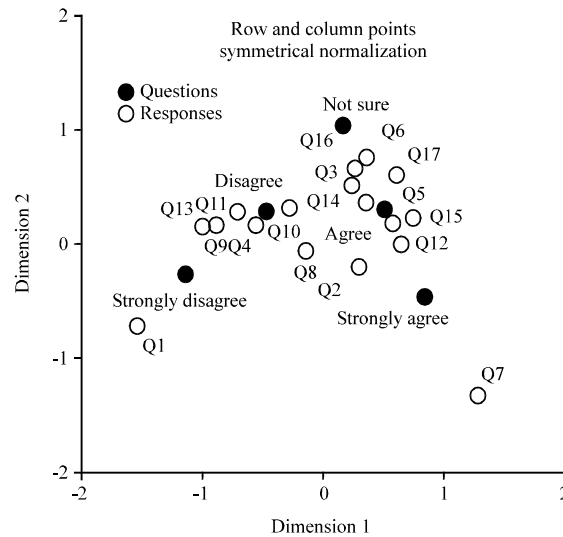


Fig. 3: The correspondence dimension plot

commuters while they were least concerned about comparing the service rendered by BRT to other public transport in the city.

The results from moderations showed that the effect on the convenience and comfort ability of using BRT are ranked from the highest to the least including the interactions:

- Security of the buses
- Reduction of commuting time
- Attitude of staff towards commuters
- The attitude of staff and the behaviour of the drivers
- The prices charged and its impact on the commuters' incomes
- The present available routes
- Reduction of traffic congestion
- State of overcrowding and the quality of the seats
- The availability of the tickets and the security at the bus stops
- The availability of buses
- The state of overcrowding
- The availability of the tickets
- The drivers' compliance to traffic regulations
- The security of the buses and the drivers' compliance to traffic regulations
- Comparison with other public mode of transport
- The price charged
- The conditions of the roads
- The behaviour of the drivers
- Reduction of commuting time and comparison with other public mode of transport
- Quality of the seats
- The security at the bus stops
- The availability of buses and the reduction of traffic congestion
- The condition of the roads and the available routes
- The impact of price charged on the commuters' income

The interactions of the moderation showed that the commuters believed that the attitude of the staff as a result of the behaviour of the drivers has the highest in the convenience and comfort in using the BRT by the commuters. Also, the affordability of the prices charged and its impact on the commuters income is also a concern to the commuters while they are least concern about the conditions of the roads as it affects the available routes meaning that despite that the available routes is inadequate but as long as the roads are in good conditions, the commuters are not concerned. Also, more BRT is needed to reduce the congestion on the roads.

CONCLUSION

Attention has to be paid on those challenges faced by commuters. The BRT have been helpful despite the challenges. Security and expansion of the available routes and the BRT staff have to be trained on effective customer relations. More buses have to be available to reduce the commuting time while efforts have to be made in making the buses more comfortable.

REFERENCES

- Adebambo, S. and I. Adebayo, 2009. Impact of Bus Rapid Transit system (BRT) on passengers satisfaction in Lagos Metropolis, Nigeria. *Int. J. Creativity Technical Dev.*, 1: 106-119.
- Adedamila, A.S., 1981. Towards Improving Traffic Flow in Lagos. In: *Transportation in Nigerian National Development: Proceedings of a Conference Held at the University of Ibadan*, Onakomaiya, S.O. and N.F. Ekanam (Eds.). Nigerian Institute of Social and Economic Research, Nigeria, ISBN: 9789781810107.
- Adenle, J.A., 1977. Factors Militating against Free flow of Traffic in Metropolitan Lagos. In: *Transportation in Nigeria's National Development: Proceedings of a Conference Held at the University of Ibadan*, Onakomaiya, S.O. and N.F. Ekanam (Eds.). Nigerian Institute of Social and Economic Research, Nigeria.
- Aderamo, A.J., 1998. Route forms and traffic flow in a medium-sized city. The case of Ilorin, Nigeria. *Centre Point*, 8: 29-43.
- Aderamo, A.J., 2010. Transport in Nigeria: The case of Kwara state. *Afr. Econ. Bus. Rev.*, 8: 19-40.
- Aderamo, A.J., 2012. Urban transportation problems and challenges in Nigeria: A planner's view. *Prime Res. Educ.*, 2: 198-203.
- Aidoo, E.N., W. Agyemang, J.E. Monkah and F.K. Afukaar, 2013. Passenger's satisfaction with public bus transport services in Ghana: A case study of Kumasi-Accra route. *Theor. Empirical Res. Urban Manage.*, 8: 33-44.
- Ali, A.N., 2010. An assessment of the quality of intra-urban bus services in the city of Enugu, Enugu state, Nigeria. *Theor. Empirical Res. Urban Manage.*, 6: 74-91.
- Almehrzi, R.S., 2013. Coefficient alpha and reliability of scale scores. *Applied Psychol. Measure.*, 37: 438-459.
- Awasthi, A., S.S. Chauhan, H. Omrani and A. Panahi, 2011. A hybrid approach based on SERVQUAL and fuzzy TOPSIS for evaluating transportation service quality. *Comput. Ind. Eng.*, 61: 637-646.

- Basorun, J.O. and O.O. Rotowa, 2012. Regional assessment of public transport operations in Nigerian cities: The case of Lagos island. *Int. J. Dev. Soc.*, 1: 82-87.
- Basorun, J.O., 2005. Human posed barriers to urban commute: Findings and reflections on Akure, Nigeria. *Int. J. Environ. Issues*, 3: 88-100.
- Braimoh, A.K. and T. Onishi, 2007. Spatial determinants of urban land use change in Lagos, Nigeria. *Land Use Policy*, 24: 502-515.
- Deng, T. and J.D. Nelson, 2010. The impact of bus rapid transit on land development: A case study of Beijing, China. *World Acad. Sci. Eng. Technol.*, 4: 949-959.
- Eboli, L. and G. Mazzulla, 2007. Service quality attributes affecting customer satisfaction for bus transit. *J. Public Transp.*, 10: 21-34.
- Irwin, J.R. and G.H. McClelland, 2001. Misleading heuristics and moderated multiple regression models. *J. Market. Res.*, 38: 100-109.
- Marcucci, E. and V. Gatta, 2007. Quality and public transport service contracts. *Eur. Transport/Trasporti Europei*, 36: 92-106.
- McDonnell, S. and M. Zellner, 2011. Exploring the effectiveness of bus rapid transit a prototype agent-based model of commuting behavior. *Transp. Policy*, 18: 825-836.
- Mobereola, D., 2009. Lagos bus rapid transit: Africa's first BRT scheme. SSATP Discussion Paper No. 9, Urban Transport Series.
- Odufuwa, B., S. Oriola and O. Otubaga, 2012. Women and the use of public transport in Nigerian traditional city-Ibadan. *Global J. Hum. Soc. Sci.*, 12: 16-28.
- Odufuwa, B.O., 2010. Gender and safety in Public Transportation: An explorative study in Lagos metropolis, Nigeria. Master's Thesis, Institute for Housing and Urban Development Studies, Nigeria.
- Ogunbodede, E.F., 2008. Urban road transportation in Nigeria from 1960 To 2006: Problems, prospects and challenges. *Ethiopian J. Environ. Stud. Manage.*, 1: 7-18.
- Ogunsanya, A.A., 1984. Improving urban traffic flow by restraint of traffic: The case of Lagos, Nigeria. *Transportation*, 12: 183-194.
- Ogwude, C., 2011. Managing transportation infrastructure in Nigerian cities. Nigerian Institute of Town Planner (NITP) and Town Planner Registration Council of Nigeria (TOPREC) Mandatory Continuing Professional Development Programme (MCPDP), Ibadan, Nigeria.
- Olayemi, O.A., 1977. Intra-city person travel in metropolitan lagos: Study of commuting in the fast-growing capital of a developing country. *Geoforum*, 8: 19-27.
- Osuji, S.C. and E.C. Onyenechere, 2013. The challenges of mobility within Owerri city, Nigeria. *Can. Soc. Sci.*, 9: 68-73.
- Sharaby, N. and Y. Shiftan, 2012. The impact of fare integration on travel behavior and transit ridership. *Trans. Policy*, 21: 63-70.
- Ugo, P.D., 2014. The bus rapid transit system: A service quality dimension of commuter uptake in Cape Town, South Africa: Original research. *J. Transp. Supply Chain Manage.*, 8: 1-10.
- Van Schuur, W.H., 2003. Mokken scale analysis: Between the Guttman scale and parametric item response theory. *Political Anal.*, 11: 139-163.
- Wright, C., 1994. Conflicts, accidents, catastrophes and chaos: Road transport in the twenty-first century. *J. Royal Soc. Med.*, 87: 403-407.