QUALITY OF SERVICE AND CRIME INCIDENTS IN PUBLIC TRANSPORT: A CASE STUDY OF LAGOS METROPOLIS

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Abstract

Crime incident is one of the greatest endemic challenges in public transport system. This study examined the relationship between quality of public transport and crime incidents with the view to examine the sustainability of public transport system in an African mega-city-Lagos, Nigeria. Multi-stage sampling procedure and sampling ratio of 0.0165% was used to randomly administered 1,599 questionnaires. Data obtained were analyzed using frequency distribution, correlation and regression analysis. Findings revealed that poor quality of bus stops, unemployment/poverty, poor law enforcement, inadequate transport infrastructure, poor land use pattern, ineffective regulation of public transport service are among the causes of crime incidence in public transport. Results also shows that there is significant relationship ($p<0.05$) between volume of crime and passengers income, educational level, age and gender. Also, a significant relationship ($p<0.01$) was found to exist between volume of crime incidence in public transport and quality of public transport system. There is a significant impact of quality of modes (waiting time, $p<0.05$; bus stop design, location and condition, $p<0.05$ on the volume of crime incidence experienced by passengers. Furthermore, a significant relationship ($p<0.01$) exists between public transport experience (length of use) of the passengers and volume of crime. This result suggests that increase patronage of public transport in Nigerian cities would be facilitated through the provision of sustainable public transport service.

Keywords: *Passengers, Crime, Public transport, Patronage, Sustainable transport, Quality of modes*

Introduction

The increasing rate of crime incidence particularly in public transport cannot be divorced from the pattern of travel and passengers travel satisfaction. The incidence and concern over criminal activities is a real; disturbing and global problem affecting the general populace Adedibu *et al*., (2005); (Agbola 2002, 2005) and Omisakin, (1998). It has permeated all sectors of urban society, including public transport systems (Page *et al*., (2000), Page *et al*., (2001), Page and Oni, 2002, and Page (2001). In Nigeria, public transport system has continuously become a major domain of numerous crimes. In recent times, passengers have persistently experienced unprecedented upsurge in cases of harassments, kidnapping, murder, robbery, assaults, injuries, loss of life and property, etc. Studies have revealed that criminal activities on public transportation systems (at least in emerging economics) are a product of society characterized by socio-economic inequality and exclusion (Burrell, 2007; Clifton, 2009 and Odufuwa, 2010; 2011). It may be conceived that, the more secure the public transport system, the more spatial interactions or patronage experienced. Unfortunately, issue of how to secure passengers life and properties in public transport system, particularly in Nigeria has not being given adequate attention. Meanwhile, scholars affirmed that prevalence of miscreants; juvenile delinquency, violence; public ignorance and apathy environmental health and transport crisis and crime are common in Nigerian commercial capital city, Lagos (Agbola, 1997; Alemika and Chukwuma, 2005 and Fadare and Oduwaye, 2009). Security needs of passengers are

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however yet to feature prominently in major transportation policy debates in Nigeria. In other words, little is known empirically about the interdependency between quality of public transport service and crime incidence. Meanwhile, awareness and knowledge of this issue could inform sensitive transport security policies.

This paper examined the nature and degree of relationship between volume of crime incidence and passengers' socio-economic variables. It analyzed and discussed the relationship between volume of crime incidence and quality of public transport system, with the view to explain passengers' patronage of the service.

Methodology

The analysis focused on the passengers of public transport in Lagos Metropolis. The choice of Lagos was informed by; being the commercial capital, industrial nerve centre of Nigeria and West Africa; one of the most rapidly urbanizing cities in the world, an important and major intra and intercity travel generation and attraction city in Nigeria. Lagos is a notable city in Nigeria that has introduced the novel public transport system-The Bus Rapid Transit, and all modes of travel in Nigeria are well represented (Olaseni, 2010 and Ilesanmi, 2010). The city is also noted for most chaotic public transportation systems and accommodates notorious driving habits in the world (Gandy, 2006). Multi-stage sampling procedure was used for selection of respondents. The first stage involved identification of 16 Local Governments Areas out of twenty (20) LGAs in Lagos State that makes up Lagos Metropolis. The second stage involved identification of 181 established and recognized terminals or motor parks in Lagos Metropolis. This was derived from the National Union of Road Transport Workers, National Transport Owners Association, Ministry of Transport, Olaseni, (2010) and a reconnaissance survey. Furtherance to the sampling method, studies argued that there are relationships between terminals, population size and urban travel patterns (Olaseni, 2010). Thus, the third stage involved a random sampling technique (dip-hand balloting) method of the total terminals in each Local Government Areas to select 30% (0.30) terminal from each Local Government Areas, given a total of 55 terminals. Based on assertion made by Alabi, (2009); Neuman, (1991); (Olaseni, 2010), a sampling ratio of 0.0165% was used to draw the sample size from relatively large population of the study area. Based on 2011 projected population of Lagos Metropolis, 1599 passengers were randomly selected. In each terminus, a random sample of passengers was chosen from total passengers on board to ensure a representative coverage. In each mode (considering the carrying capacity) simple random sampling technique of dip-hand balloting method of total passengers was used to select passengers. Passengers were surveyed using a structured questionnaire and informal interview. The 16 Local Government Areas covered and numbers of respondents are shown in table 1.

The Questionnaire used was divided into three sections; the first section sought for information about socio-economic variables-income, education, household size, etc. The second section probed into travel characteristics, specifically, purpose of trip, mode of travel, trip frequency, cost of travel, travel difficulties, travel time, vehicle ownership. The last section enquired about quality of public transport (mode)-(quality of modes, supply of service, location of bus stop, travel distance, waiting time etc., and crime incidence in public transport (time of occurrence, causes, location, perception of crimes, nature of injuries, contact with police or police involvement etc.,). Respondents were asked to recount criminal incident experienced as (victim) or witnessed as (observant) when using public transport system. It is pertinent to note that, crime and transport related variables were measured using dummy and interval scale. Dummy variables were used for data in binary or dichotomous form rather than interval or ratio scale. Some socio-economic variables were measured as follows: age (total in years); household size (total number in the household); income (total income in naira); etc. Dummy variables were also used to measure quality of public transport, mode condition, location, design and condition of bus stops.

Hypotheses:

(i) There is no significant relationship between passengers' socio-economic variables and volume of crime incidents experienced in public transport.

(ii) The volume of crime incidents in public transport is a function of quality of public transport service.

Correlation, regression and analysis of variance techniques were used to test the stated hypotheses. The correlation coefficient analysis was used to investigate the relationship between volume of crimes in public transport system and some socio-economic variables. It was also used to determine the relationship between quality of public transport system and volume of crime incidence experienced by passengers. Multiple regression analysis was applied to investigate and explain the variables that predict/causes crimes incidence in public transport system.

Results and Discussion

Relationship between volume of crime and socio-economic variables

Table 2 shows the results of the simple bivariate (correlation) between the explanatory variables for all the 1599 passengers. Gender, marital status, occupation, automobile ownership, travel mode, ability to drive, education, household size were analyzed using the dummy approach. This approach has being used by (Okoko, 2008; Olaseni, 2010; Oyesiku, 1995). More importantly, the zero-order correlation coefficients between the explanatory variables as revealed in Table 2 have the highest correlation coefficient of 0.716 (between gender and crime incidents). Also, there is a strong positive correlation co-efficient of not less than 0.50 between crime incidents experienced by passengers and the following variables; AGE (age), INCOM (income), OCCP (occupation), TRAVCST (travel cost) and TRAVMD (travel mode). A fair positive correlation of 0.462 exists between crime incidents in public transport and passengers' educational status-EDUC (education). Furthermore, a weak positive correlation exists between crime incidents and HOSHS (household size), HOSVO (household vehicle), DRVAB (driving ability), MARST (marital status). It is imperative to note that this result does not show any serious multi-colinearity occurring between the independent or explanatory variables.

The positive and significant relationship between gender and crime incidents, is worthy of note. Both variables are closely correlated; gender of passengers in the study area determines the types and occurrence of crime in public transport. In other words gender status of passengers increases the opportunity for criminality in public transport, specifically in the study area. As noted in literature, female passengers are the worst hit of criminality in public transport. Their perceived weakness or incapability to handle criminal activities or offenders among others makes them a vulnerable group in public transportation, particularly in the study area.

Impact of quality of public transport, crime incidence and patronage

Table 3 shows that availability of mode (0.501), cost of travel (0.273), speed (0.358), passenger's carrying capacity (having a negative coefficient of -0.205), engine condition/breakdowns (0.417), mode design (0.163) as well as the window condition (0.106) are found to be significantly related with crime incidence in public transport.

Table 4 shows the analysis of variance F-ratio of 51.58, (significant at 0.05 levels), while the R-squared (R^2) value indicates that about 17.4% of the variation in incidents of crime in public transport was determined or explained by the identified quality of mode variables (the predictors). This finding reveals that quality of mode is a vital component of crime incident in patronage of public transport. It also forms a notable factor in evaluating the efficiency of public transport system. Quality of public transport service encompasses many factors such as speed, quality of travel information provided to passengers, comfort, tidiness, security of bus stops or waiting areas, condition of mode, etc. Inaccessible and poor design of bus stops can limit patronage, lower the efficiency of public transport, and discourage or encourage passengers to use other modes of travel, particularly private vehicles, which are more expensive.

Conclusion

Criminality in public transport system will remain an important challenge in Nigerian cities, because of its adverse effect on routine activities-spatial interactions and general level of cities productivity. If the present diminishing quality of public transport service, poor transport infrastructure, land use planning and design of bus stops continues unabatedly and uncheck mated; crime incidents will continue to seriously threaten the patronage and sustainability of public transport in the study area (Odufuwa, 2011). Findings from this study relates to the views of Cozens, *et al*., (2004); Brantingham, *et al*., (2008); Page, *et al*., (2002); Lynch, *et al*., (1988); Loukaitous-Sideris, (2008) on the relevance and extent to which crime incidents in public transport are determined by the quality of public transport system. Analysis from this study shows that, a good number of passengers were dissatisfied with the quality of available public transport service. The positive correlations between crime incidents and quality of public transport, implies a high level of sensitivity of passengers to quality of service related attributes. A probable reason that can be deduced from this finding is the prolong waiting time, poor response rate to vehicle breakdown, unfriendly attitude of operators, poor state of operational mode, unavailability of mode and unregulated nature of the service among others. The results is similar to the work of Page, *et al*., (2000) who noted that the quality of mode or operational characteristic of public transport is a factor that constitutes a major factor of crime incident and patronage of public transport system.

A point of note, particularly in Lagos metropolis is the influx of unconventional modes of public transport, due partly to inability of government to provide or supply adequate conventional mode of public transport that will accommodate the mobility demand or needs of the people. Operation of public transport service have grossly being dominated by private operators, whom for the reason of poor transport facilities, most importantly road network and inadequate law enforcement or security among others as indicated earlier are not capable to handle the increasing crime incidents in public transport. Meanwhile, passengers or people desire for a secure and safe travel in public transport, expect some levels of interventions. Generally, the study noted that perceived security performance and quality expectation in public transport fell short of passengers' expectations. This indicates that quality and security level of public transport in the study area did not meet passengers' mobility needs. Therefore, to enhance sustainable spatial interactions and facilitate an increasing use of public transport in the area, passengers were of the view that, increase supply and effective regulations of public transport, good location, design and management of bus stops, improve travel information and transport infrastructure, adequate law enforcement, increase job opportunities, provide affordable travel fare, increase public awareness campaign on the security of public transport and effective stakeholder participation in public transport planning and management would go a long way to reduce the incidence of crime in public transport system.

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TABLE 1 2006 and 2011 National Population Figures of Metropolitan Areas of Lagos State and Sample Size

LGAs	Population *(2006)	Projected Population **2011	Male	Female	Sample Size (0.0165 %)
Agege	459,939	521,295	242,520	217,419	87
Ajeromi-Ifelodun	684,105	775,365	352,238	331,867	128
Alimosho	1,277,714	1,448,161	649,460	628,254	239
Amuwo-Odofin	318,166	360,609	167,856	150,310	60
Apapa	217,362	246,358	119,556	97806	41
Eti-Osa	287,785	326,176	160,396	127,389	54
Ifako-Ijaye	427,878	484,957	218,993	208,885	80
Ikeja	313,196	354,976	169,233	143,963	59
Ikorodu	535,619	698,260	272,569	263,050	115
Kosofe	665,393	754,156	350,120	315,273	124
Lagos Island	209,437	237,376	108,057	101,380	39
Lagos Mainland	317,720	360,104	160,568	157,152	59
Mushin	723,009	717,452	328,197	394,812	118
Ojo	598,071	677,854	310,100	287,971	112
Oshodi-Isolo	621,509	704,418	321,767	299,742	116
Shomolu	402,673	456,390	207,649	195,024	75
Surulere	503,975	571,205	261,265	242,710	94
Total	8,563,551	9,695,112	4,400,544	4,163,007	1,599

Source: *National Population Commission of Nigeria, 2006**;** ** Projected Population (2011)

Table 2 Variable Definitions

S/N	Variable(Data source)	Operational Definitions
1.	Volume of crime (***Dependent Variable***)	Number of times respondents has witnessed or be a victim of crime in public transport, expressed as *continuous variable*
2.	Age	Total age of respondents in years - *continuous variable*
3.	Household size	Total number in the household- *Continuous variable*
4.	Sex	*Dichotomous variable*: 1=male; 0=female
5.	Income	Total income in Naira- *Categorical variable*
6.	Educational level	*Dichotomous variable*
7.	Time spent in travel	Total travel time: *Continuous variable*
8.	Waiting time	Time spent in bus stop: *Continuous variable*
9.	Quality of bus stops	*Dichotomous variable*: 1 each if the following facilities/services are bad: shelter, seats, clean, location, toilet, light, and general condition of the bus stop; 0= otherwise
10.	State of security during & after trips	*Dichotomous variable*: 1 each if police is available, no rush/crowdedness, no harassment, no strange look; 0 = otherwise
11.	Number of trips	Total no. of trips per purpose: *Continuous variable*
12.	Street light condition	*Dichotomous variable*: 1= available & functioning; 0= otherwise
13.	Length of years of using public transport	Total years of using public transport: *Continuous variable*
14.	Police involvement	*Dichotomous variable*: 1= if police is involved; 0 = otherwise
15.	No. of passengers	Total no. of passengers on trip: *Continuous variable*
17.	No. of Crime incidence	Total crime incidence: *Continuous variable*
18.	Quality of mode	*Dichotomous variable*: 1 each if the following are bad; engine, seats, cleanliness, body/structure, colour; 0= others
19.	Quality of travel environment	*Dichotomous variable*: 1 each if it is: dirty, abandoned sites, bad lighting and facilities, scaring, bad road; 0= others
20.	No. of victims	Total no. of victims: *Continuous variable*
21.	Duration of operation/crime	*Categorical variable:* Total crime operation time
22.	Desire to use public transport if secured	*Dichotomous variable*: 1 if passengers will use public transport if secured; 0 if otherwise
23.	Availability of private vehicle(s)	*Dichotomous variable*: 1 if own private vehicle; 0 if otherwise
24.	Capability to handle crime situation	*Dichotomous variable*: 1 if capable to handle crime incident; 0 if otherwise.

Table 2 Correlation Coefficients between Crime Incidents (Dependent Variable) and Socio-Economic Characteristics of Passengers- (Independent Variables -*Explanatory Variables*)

	VOLCRM	AGE	INCOM	GEND	HOSHS	OCCP	HOSVO	EDUC	MARST	TRACST	TRVMD	DRVAB
Y	1.00	0.612	0.530	0.716	0.116	0.557	0.213	0.462	0.074	0.531	0.603	0.029
X1 AGE		1.00	0.053	0.007	-0.013	0.432	-0.071	0.342	-0.051	0.441	0.508	0.363
X2 INCM			1.00	0.137	0.501	0.521	0.416	0.547	-0.271	0.529	0.661	-0.018
X3 GEND				1.00	-0.032	-0.030	0.210	0.573	0.325	0.672	0.575	-0.153
X4 HOSHS					1.00	0.381	0.461	0.521	0.531	0.636	0.471	0.684
X5 OCCP						1.00	0.428	0.618	-0.168	0.446	0.629	-0.032
X6 HOSVO							1.00	0.625	0.318	0.496	0.593	0.512
X7 EDUC								1.00	0.125	0.379	0.601	-0.076
X8 MARST									1.00	-0.240	0.569	-0.261
X9 TRVCST										1.00	0.573	-0.015
X10 TRVMD											1.00	0.239
X11 DRVAB												1.00

Definitions of Variables

AGE: Age

INCM: Income

GEND: Gender

HOSHS: Household Size

OCCP: Occupation

HOSVO: Household Vehicle ownership

EDUC: Education

MARST: Marital Status

TRVCST: Travel Cost

TRVMD: Travel Mode

DRVAB: Driving Ability

Table 3: Regression Coefficients of Quality of Mode Factors and Crime Incidents in Public Transport

Quality of Mode Factors	B	Std Error	Beta	t	Sig. (P)
(Constant)	4.639			3.521	0.87
Availability	0.501	0.072	0.574	6.218	0.000
Cost of Travel	0.273	0.046	0.629	5.502	0.000
Speed Rate	0.358	0.035	0.417	6.248	0.000
Passengers Carrying Capacity	-0.205	0.071	0.370	4.203	0.000
Engine Condition/ Break down	0.417	0.041	0.572	7.426	0.000
Mode design	0.163	0.052	0.643	8.173	0.000
Window Condition	0.106	0.026	0.351	5.342	0.000

P Significant at 0.05

Table 4: ANOVA- F-Test Value from the Regression of Quality of Mode Factors

Simple R	R-Square	Standard Error	Analysis of Variance	Sum of Square	df	Mean Square	F	Sig.
.417	0.1739	0.617	Regression	119.768	6	19.961	51.579	0.000
			Residual	325.819	842	0.387		

Significant at 0.05