

# Statistical Modeling of Patronage of Commercial Motorcycle Transport Services and Factor Specifics: An Emerging Intra-Urban Study Auchi, Nigeria.

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## Abstract

It is generally believe and unarguably understandable that economic, political, social and cultural reasons compel people to move from place to place in order to seek the benefits and other reasons capable of improving life, education/exposure and transaction. Thus, transportation is a derived demand. This paper critically study the factor specifics responsible for patronage of commercial motorcycle transport service with a view to devising empirical model that may establish relationship between patronage and identified factor specific such as social-economic, choice and reason for patronage. Structured questionnaires were administered based on stratified and random samplings. Standardized likert scale was used to mine the data for the study. The analysis was carried out electronically using statistical software **Gretl 2.8**. The model indicated direct relationship between the level of patronage and choice of motorcycle operators by patron but have inverse relationship among socioeconomic, reason and level of patronage of commercial motorcycle transport services. It showed that a relative change in the reasons for not patronizing motorcycle, factor determining choice of motorcycle operators by patron and social economic characteristics of patrons will result in 154.7% decrease, 44.8% increase and 105.7% decrease in the level of patronage of commercial motorcycle transport services in Auchi intra-urban in Nigeria.

**Keywords:** Gretl, Okada, Statistical Modeling, Patrons, Auchi, Motorcycle Services

## 1. Introduction

There are miscellanies of economic, political, social and cultural reasons that compel people to move from place to place in order to seek the benefit of personal travel. Thus, transportation is a derived demand. The importance of people movement from place to place in the geographic space cannot be overemphasized as settlements the world over, are characterized by a set of spatially separated and highly specialized land uses which is accompanied by intricate pattern of trip generations (Hoyle and Knowles, 1998; Fadare and Salami, 2003; Aderamo, 2004). The patronage of modal options to meet with the demand–supply complimentarily across geographic space has according to Adeniji (1986) been influenced by “the economic and technological sophistication of a place, activity patterns, the physical structure and the social – economic characteristics of commuters”. The differentials in socio-economic status of commuters also affect their preference for transport mode in the daily intra and inter urban movement to activity places.

In transportation literatures, intra urban modes of transport are classified into conventional (public transport) and informal (Para transit) modes. The typologies of modes under the conventional category are buses, trans-ways, and underground rail system among others. In the major cities of developing countries, the supply and operations of conventional means of transport is plagued with intractable problems that seem to grind the transportation system to a state “of relative immobility” (Fadare, 1988; Ikporukpo, 1988; Ikya, 1993). Consequently informal modes are patronized for most intra and inter urban passenger travels. For instance, Coombe and Mellor (1987) observed that the strike action by conventional bus operators in Hong Kong in 1967 paved way for a legislation in support of paratransit services in 1968. Another instance includes the ‘*Bakassi*’ of Khartoum, which evolved following the City Bus Services incapacitation (Roth and Wayne, 1982). Similarly, Yearsely (1968) noted the emergence of ‘*Matatus*’ in Kenya since the late 1950’s and subsequent legal backing of the mode in 1973 because of growing passenger demand coupled with the insufficient services of the Kenya Bus Services (KBS). In Malaysia, minibuses were introduced in 1975, partly in response to the incapacity of the existing eight franchised bus company to renew their fleet and expand their services (Adesanya, 1988). In Nigerian besides the complex problems associated with the entire transport system, the inadequacy and failure of

the public mass transit scheme was an engendering catalyst to the ubiquity of informal modes of transport like 'Okada', etc (Olanrewaju et al, 1995; Ikporukpo, 1988; Ikya, 1993).

Paratransit modes in developed countries include modal options as car pool, rental cars, railbus, social car, multiple-services bus, specialized commuter bus services, etc (Nutley, 1988; Okoko, 2000). In less developed countries, paratransit exist as *molue*, taxi cab, minibus, motorcycle, tricycle etc (Olanrewaju et al 1995) with different ethnic and geographic nomenclatures (Adesanya, 1998; Okoko, 1998).

A common feature in virtually all Nigerian towns and cities is the use of motorcycle as a means of intra – urban and sometimes inter settlement mode of transportation. Ojo Madueke, the erstwhile minister of transport in Nigeria, regarded the mode as a primitive nuisance that will disappear with time in official circle (The Nigerian Observer, 2008:8). However, recent pronouncements of some individuals, state governments and actions of many local governments suggest a gradual official acceptance of this mode for public transportation and a poverty alleviating tool (Uwaleke, 2002; Musa, 2002; Obayagbona, 2002). It is doubtful today if there is any Nigerian town and city that can survive and function efficiently without the services of commercial motorcycle (Fasakin, 2001) given that no fewer than two million Nigerian use 'Okada' as a means of livelihood (The Nigerian Observer, 2008:8), reckoning also with the deplorable state of the country's transportation system.

The demand for motorcycle as a means of intra and inter urban transport is partly due to the inherent advantages of the mode such as its flexibility and ability to provide frequent and viable services especially where poor roads and long queues have prevented taxi and buses from operating efficiently (Okoko, 2000). This relative advantage according to Ocampo (1982) has significantly helped in bridging the gap between public bus and private automobile. Another interesting aspect of motorcycle operations is reflected in the relatively low operation cost, modest energy consumption, and limited space necessary for operation, accessibility and flexibility to meander through traffic hold-ups, nooks and corners of urban areas. Besides, their versatility, variety and local innovations make them adapt quickly to difficult conditions in their area of operation often at no cost to governments.

Consequently, in the light of the foregoing, Nigeria is fast becoming a lucrative market for Asian brands of motorcycles. This is evident in the recent importations, promotions and sales of these brands of motorcycle like Suzuki, Jincheng, Honda, etc. Oyesiku (2003) noted for instance, newly registered motorcycles increased from around 4000 in 1990 to 25, 000 in 1996. The use of motorcycle further rose remarkably, almost double fold in 1999 as newly registered motorcycles in various cities in the country rose from 26,000 in 1997 to about 58,000 in 1999.

In recent time, few studies exist on motorcycle as a public transport mode albeit limited in scope to reveal the underlying factors that motivates patronage of the mode. The aim of this paper therefore, is to limelight the factors that influence the patronage of commercial motorcycle services as a public transport mode in Auchi. It also will examine what motivate patron's choice of the services of an operator of motorcycle. It is hopeful that the findings will ventilate the scope and operations of the mode in order to evolve effective policies towards the sustainable services of the mode in Nigeria.

## 2.0 Study Area

The study area for this research is Auchi, the municipal headquarter of Estako-West Local Government Area in Edo north Senatorial district located in the south-south geopolitical zone of Nigeria. In terms of urban hierarchy it is the second largest settlement in Edo State after Benin City, the state capital. The town has a long standing administrative status dating back to the 1920s as the provincial headquarter of the former Afemai lands. This factor perhaps has made the town a political and socio-economic oasis of the Edo-north region thus engendering phenomena of urbanization and transportation demands in response to urban sprawl, complex land use and social interactions.

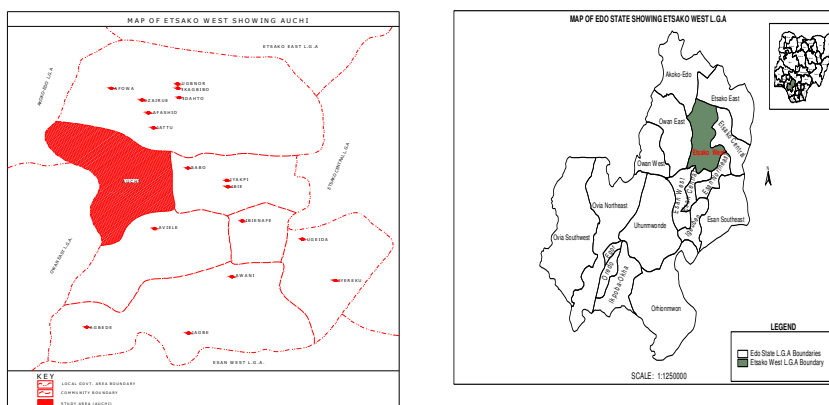
Located between latitude 7° 4' 0" North of the equator and longitude 6° 16' 0" East of the Greenwich Meridian (See fig. 1). Auchi occupies a land area of 50 kilometer square characterized with a mixed pattern of landuses but predominantly residential and commercial in the built-up areas. Traditional compound building with a reticulate network (with few exemptions) define the entire morphological make-up of the town with visible impression of no physical development planning. The outlying suburb comprise new residential sprawling development not linked together in a definite fashion, thereby creating accessibility problems.

The town has experienced rapid spatial and population growth in the last two decades. For instance, the population increased from about 13,591 in 1963 to 30,000 inhabitants by 1991 population census. In 2005, the estimated population stands at 80,000 people with 3.5% growth rate. The 2006 census as not be officially declared. Characterized by spatial peripheral accretion owing to the teeming population and sprawling suburb, the structure of Auchi over the years has shown a continued increase in the distances separating homes from the various centers of socio-economic and cultural activities. The bulk of commercial landuses attracting both pedestrians and motorized traffics (Banks, markets, schools and worship centres etc) are located at the core of

the town along the few major tarred roads. This strategic sitting of traffic generating landuses in the high density area of the town has significant impact on the travel patterns, demands and methods in the town. Like other Nigerian traditional settlements, most of the roads in Auchi particularly in the core areas, were not designed to accommodate vehicular traffic as such. Even when tarred, due to township improvement, the manifest is still the obvious problem of narrow, winding and inadequate motorable traffic corridors. As most of the roads and streets are not tarred, this make them meshing and unsuitable for trekking during the raining seasons. The situation is further constraint by government irresponsibility toward municipal infrastructures development and maintenance, coupled with financial mismanagement at the grassroots level.

The transport system of the town is therefore dominated by trekking and motorcycle transport services such that often times the ratio of motorcycles to other modes of intermediate category is about 3.1 (Iyawe, 2001). This situation favours the patronage of commercial motorcycle operations as their services convey commuters' to and fro inaccessible areas of the town.

Fig. 1



### 3.0 Research Methodology

The data for this study were collected in 2012 from household questionnaire survey covering 316 households distributed among five quarters (Iyekhei, Usogun, Akpekpe, Igbei and Aibotse). However, only 289 questionnaires were returned and nearly 65% (187) Respondents meet the research questions stratification. Taro Yamani sample size determination for finite population procedure was adapted to achieved the sample of those that patronize the services of commercial motorcycle for their intra-urban travels. The survey was essentially systematic in nature. The town was divided into five quarters using the administrative boundaries of the quarters. To obtain the sample size, a physical census of houses in the various quarters was carried out with the aid of field assistants in a preliminary study. The number of billed houses from Power Holding Company of Nigeria (PHCN) office in Auchi and the number of houses with immunizable children obtained from the Local Government Primary Health Centre (PHC) was respectively used as checks. From the survey, the average estimation of residential buildings numbered 3,016 buildings (habitable). Thus, the target group for the study was the total number of household that occupies the houses. The questionnaire modules elicited information on household socio-economic attributes, factors in the choice of motorcycle operator, car/motorcycle ownership status, and approximate distance in kilometer respondent traveled with motorcycle the previous day, the number of times they make trips with motorcycle and whether or not they make trips with the mode.

The empirical analysis of relationship was specified and model designed for evaluating the direction and magnitude of the relationship of model. Exploratory data analysis was employed to determine the pattern and the behaviour of the factor specific to patronage. The responses were mined descriptively with the aid of standardized 5 point likert scale of class 4-0 range. Data were analysed electronically with the use of dedicated statistical softwares known as GREL Version 2.8.

### 4.0 Model Specification

To bring to the understanding of the study an empirical relationship is required to defining and specifying the factor specifics of the variables of commercial motorcycle transport services and the links proximity of level of patronage in the area of the research focus. The model for the study is specified as follows;

PLMTS= level of patronage of commercial motorcycle transport services

SECP= social economic characteristics of patrons

DCMOP= and factor determining choice of motorcycle operators

RNPMTS= reasons for not patronizing motorcycle

#### 4.1 The Model:

$$PLMTS = f(SECP, DCMOP, RNPMTS)$$

$$PLMTS = \alpha_0 + \alpha_1 SECP + \alpha_2 DCMOP + \alpha_3 RNPMTS + \varepsilon$$

## 5.0 Result and Discussion

### 5.1 Demographic Information Analysis

#### 5.1.1 Socio – Economic Characteristic of Patrons

The socio-demographic data revealed that the services of commercial motorcycle enjoy the patronage of both male (51.6%) and female (48.4%) with majority of the respondent aged between 21 – 30 years (48.4%). This implies that gender factor is not skewed against any sex, and the predominant patrons are among the active age bracket in the population cohort who have more need for travel and trip making. Occupationally, about one third (40.7%) of the patron in the study are student with less than half (37.3%) of them with an average monthly income of ₦10, 000.00 naira. The income level of patron is an index to determine their car ownership status and also to determine their propensity for travel and motorcycle patronage. Car ownership among the patrons was low, put at 19.8%, while those without car are high with 80.2%. The low car ownership is reflective of the fact that most of the respondents are student who earn a little above ₦10, 000.00 monthly and are most likely to depend on relations for up keep.

Similarly, the analysis of private motorcycle ownership rate is low, as only 23% of respondents owned their own personal motorcycle, thus leaving 77% of patrons without. The low ownership of personal means of transport could necessitate dependency on alternative public commercial means of transport, particularly the service of motorcycle for intra-urban travels, due to the intrinsic and relative advantages of motorcycle services over public modes in the Nigerian transportation scene. Essentially, it could be infer that most of the respondents are captive patrons.

#### 5.1.2 Patronage Level of Motorcycle Transport Services

Of the 217 respondents, 176 (81.1%) admit patronage of commercial motorcycle transport services for intra and inter urban trips making. However, 41 (18.9%) responded that they do not make trips with motorcycle; even though, a significant percent of respondent do not own personal means of mobility, and coupled with the fact that there is the paucity of other transport modal service in the study area for intra-urban trips.

A standardized 5 point Likert Scale Response Analysis (LSRA) was used to obtain a relative ranking of possible reasons why some respondents (18.9%) do not patronized the services of commercial motorcycle for trip making. As indicated in Table 5.1.2, the strongest reason with the highest means ranking factor of 4.12, why some commuters do not patronize of the services of mode was because they do not consider it safe for travel and trip making. Inferentially, the flexibility and unregulated traffic operations of commercial motorcycle predisposes the mode and its services to high accident risk. This perhaps induces phobia in commuter against patronizing services of commercial motorcycles. The fear of traffic safety is confirmed by the fact that as much as 24.9% of patrons interviewed in the study area have had at least an accident on motorcycle within the last five years of patronage. In an earlier study by Fasakin (1999) in Lagos and Akure, Lagos recorded about 26% involvement in one or two motorcycle accidents while Akure recorded 12% of similar occurrence. However, Onuba<sup>1</sup> (2008) quoting the F.R.S.C reported that 'Okada' account for 13.5% of Lagos state road traffic accident. Exposure of sensitive part of the body in the course of patronage (particularly amongst females) was the next important reason in ranking with mean value of 4.61, why some commuters do not want to patronize commercial motorcycle services. However, the concern of commuters with this issue perhaps will depend on gender, dressing, custom and belief, the design of the motorcycle, kind of trip, and the availability of other transport modal options. Some commuters would not however patronize the mode because it is not convenient for their kind of travel/trip demand (3.56). Thus, travels/trip making associated with certain demands or characteristics like heavy luggage, high profile social functions, or poor weather conditions, etc may exclude commercial motorcycle transport services as the desirable modal choice.

Other reasons, albeit less important, are immodest body contact and not my taste of mode with equal mean of 3.34, and lastly health reasons (2.39). For instance, on a dusty or cold weather day, some commuter with asthma and flu symptoms will not find patronage of motorcycle conducive.

*Table 5.1.2.: Likert Scale Analysis of Reasons for not Patronizing Motorcycle Transport Services*

Reasons	Mean	Ranking
Not Safe	4.12	1
Not convenient for my trip	3.56	3
Health Reason	2.39	5
Not my taste	3.34	4
Immodest Body Contact	3.34	4
Exposes sensitive parts of my body	3.61	2

Source: Field Survey, 2012.

### 5.1.3 Factors that Determine the Patronage of Motorcycle Transport Services

The study indicated that above three quarter (81.5%) of the respondents make trip with commercial motorcycle for intra – urban travels. From Table 4.3, the most important reason for patronage of commercial motorcycle are that: it offers door to door services (4.66); it is faster (4.36); it is easily available compared to other modes of transport in the study area (4.34); it assist in path (route) finding, particularly for first time travelers who may not be familiar with the townscape and thus require a tour guide to direct them to their destination (4.16). Other less important reasons for the patronage of commercial motorcycle transport services are because of convenience ( $x = 3.437$ ); patrons have no definite reason for patronage (3.08). For some respondent (38.7%), it is because the fare (operative charges) is cheap enough for their kind of trips compared to the cost of patronizing the services of other mode. The least ranking factors patrons consider in their patronage of the mode, is because they have no other means of transport plying their travel destination (2.86) apart from commercial motorcycle.

*Table 5.1.3: Likert Scale Analysis of Factors that Determine the Patronage of Motorcycle Service*

Reasons	Mean	Ranking
Fast (speed)	4.36	2
Cheaper(fare rate)	3.07	8
Offer door-to-door service	4.656	1
Easily available	4.34	3
More convenient	3.44	5
Path finder	4.16	4
No other mode to My destination	2.86	9
No choice	3.08	7
Efficiency	3.20	6

Source: Field Survey 2012.

### 5.1.4 Factors that Determine Choice of Motorcycle Operators Service by Patrons

Unlike other transport modal services – rail, boat, plane, bus and taxi cab – where schedule, routing assignment, and queuing determine the turn and operator of a carriage, motorcycle transport service operation is usually fluid, implying that operators have to ride and scout for passengers. With this nature of operation and flexibility, commuters are often at liberty to choose their operators for convenient services. Understanding the factors that influence commuter’s choice of operators’ service will be informative. The underlying motive will prepare motorcycle operators to meet with their client (commuters) taste in the competitive field of operation, especially when economic reason is the motivating force behind operation. This will also influence the time spent scouting, the daily profit, lost of fuel, etc.

From Table 5.1.4, the likert scale analysis of possible factors that could influence the choice of

operator's service by commuter revealed that the highest ranked factor is the Age/maturity of operator with a mean score of 4.142. Next is composure/look of operator with mean score of 3.78; while the third ranked factor was the newness of motorcycle with mean of 3.698. Other factors in descending order are: Availability of the mode (3.55), safety apparatus/helmet (3.21) and lastly type/brand of motorcycle, with mean of 3.70.

The analysis conclusively shows that commuters' perception of the personality (composure/look of operator; age/maturity of operator) and newness (Neatness of the mode) informs why commuters (patrons) patronizes some motorcycle operators more. Commuters' valuation of these attributes has implication for healthy body contact, security risk, social and road safety consideration.

Table 5.1.4: Likert Scale Analysis of Factors that Determine Choice of Motorcycle Operators by Patrons

Reasons	Mean	Ranking
Composure/look of Operator	3.78	2
Age/maturity of Operator	4.14	1
Newness of Motorcycle	3.70	3
Brand of motorcycle	2.90	6
Availability	3.55	4
Safety apparatus/Helmet	3.21	5

Source: Field Survey, 2012.

#### 5.1.5 Socio-Economic Attributes of Patrons on Daily Patronage of Commercial Motorcycle Services

At this stage, a hypothetical relationship between the rate of daily patronage of commercial motorcycle transport service and patrons socio-economic characteristics is explored. An understanding of the nature of influence or relationship between the two would be instructive and insightful in prescribing policies towards an effective management of commercial motorcycle operation for achieving an integrated and sustainable transportation system in Nigeria.

Model 1: OLS, using observations

Dependent variable: PLMTS

	coefficient	std. error	t-ratio	p-value
const	10.2659	1.95781	5.244	0.0345**
DCMOP	0.448814	0.544654	0.8240	0.4966
RNPMTS	-1.15469	0.429846	-2.686	0.1151
SECP	-1.05657	0.380839	-2.774	0.0091**
Mean dependent var	4.003500	S.D. dependent var	0.614667	
Sum squared resid	0.275522	S.E. of regression	0.371162	
R-squared	0.854150	Adjusted R-squared	0.635374	
F(3, 2)	3.904231	P-value(F)	0.210593	
Log-likelihood	0.728909	Akaike criterion	6.542183	
Schwarz criterion	5.709221	Hannan-Quinn	3.207767	

Excluding the constant, p-value was highest for variable 3 (c)

Source: Gretl 2.0 Regression Output

The model estimated  $PLMTS = 10.2659 - 1.05657SECP + 0.448DCMOP - 1.5469RNPMTS$  revealed that there is direct relationship between level of Patronage of commercial motorcycle transport service and factor determining choice of motorcycle operators by patron but inverse relationship exist among social economic characteristics of patrons and reasons for not patronizing motorcycle and the level of patronage. The degree of association among the factor specific and patronage level of commercial motorcycle is about 92.4%. The analysis for further showed that the factor specific can explain the dependent variable at 63.6% while the model fitted is about 85.4%. The probability of the t-statistic of SECP indicated that socio-economic characteristics of the patrons is statistically significant to the level of patronage while reasons for not patronizing motorcycle and factor determining choice of motorcycle

operators. In addition, a relative change in the reasons for not patronizing motorcycle, factor determining choice of motorcycle operators by patron and social economic characteristics of patrons will result in 154.7% decrease, 44.8% increase and 105.7% decrease in the level of patronage of commercial motorcycle transport services in Auchi intra-urban in Nigeria.

## 6.0 Conclusion

The paper has critically examined the patronage issues associated with commercial motorcycle transport service in Auchi, Edo State, Nigeria. Empirical investigation showed that the socio-economic characteristics of patrons of the mode strongly influence the operation of modal service. However, the peculiar characteristic of motorcycle as a flexible mode in penetrating the nook and cranny of towns and urban areas, not well endowed on free traffic, topography and accessible land uses enhance its patronage among other modal options. Discretionary perception of patronage of operators' services, commuters (Patrons) rate highly the personality of operators as an influencing factor in patronage of an operator. The model established that specific factors are not statistically significant to the level of patronage but factor determining choice of motorcycle operators by patron is highly significant as the probability of the t-statistic is less than the 5% critical value.

## 7.0 Recommendations

We therefore recommend that in view of the deplorable transport system and road traffic congestion, government should integrate motorcycle into the overall transportation system to serve as a complimentary inter-modal linkage; and local operators should be sensitized routinely through their union to look decent and clean during operation in order to win the patronage of commuters. Certain age limit as entrant into the business should be enforced by union and FRSC in order to mitigate the risk associated with accident. Most importantly there should be introduction of low carbon emission cycle into the Nigeria market by manufacturers as it will not only contribute to reducing transportation problem but also maintaining green and health environment for humans and nature.

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