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EVALUATION OF RESIDENTS' INTRA-URBAN TRIP PATTERNS IN OSOGBO, OSUN STATE, NIGERIA

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Abstract
Intra-urban mobility is a manifestation of an individual's behaviour and it has the features of being habitual and repetitive occurring in explicit pattern. This gives rise to studying the evaluation of intra-urban residents' trip pattern in Osogbo, Osun State through analyzing the socio-economic characteristics of the residents and evaluating the proportion of weekly travel trips. Data required for this study was collected through a primary source using a structured questionnaire. A total of 285 copies were administered randomly to respondents in six neighbourhood andanalyzed using the descriptive statistical tool to present the mode of intra-urban trip patterns of movement and proportion of weekly travel. GIS was used to analyze the trip frequency patterns. The study established that 34% of the respondents preferred mini bus as their means of transportation, 44.0% of respondents within the age range of 31-40 years prefer mini bus, 25.9% of the respondents engage in religious trips, 29.4% recreational trips and 17.8% shopping trips during the weekends, while trips to work had the highest trips among other weekly trips. A Likert scale generated a weighted value of resident's satisfaction with intra-movement; reliability (3.16), security (3.15), safety and security (3.15), cost of travel (3.12) waiting and lack of bus-top (1.53). The study revealed that the pattern of movement in the study area is determined by concentration of activities in certain location. It therefore recommends that adequate mass public transport should be provided for residents along the routes linking major activities areas.

Keywords: Transportation, Residents, Intra-Urban, Trip patterns, Socio-economic, Activity

Introduction

The process of movement of commuters, goods and services from place to place can determine the regional patterns of development, economic viability, environmental impacts, and maintenance of socially acceptable levels of quality of life (Ahas *et al.*, 2010). Transportation is a precondition for spatial interaction and a central dimension of the national and global production systems that are reshaping the world. Various activities of man in an environment attract movement to different land use from one end of a city to another. These activities include working, shopping, worshiping, recreating, trading among others which require movement of people or goods to meet daily needs (Muhammad *et al.,* 2013; Fadare and Morenikeji., 2001).Urban center all over the world are characterized by a set of complex activities which actually account for the concentration of people. Parts of the city with either high concentrations of socio-economic facilities or heterogeneous land-use patterns would attract more trips to themselves than zones that are homogeneous in nature (Adetunji, 2010).

Intra urban mobility is an expression of an individual's behaviour and it has the characteristics of being habitual, and repetitive in explicit patterns which take place as a result of urge or desire to satisfy felt needs arising from the separation of land uses. In urban centers worldwide, human travels take place when residents carry out their different activities in different places either by necessity or by choice (Solanke, 2014). Households move in order to enhance their social status and to be with a greater number of persons.

For many urban centers in the more developed economies with long history of urban planning, residential areas serve as origins, while the different locations of various socio-economic service centers serve as destinations for a high percentage of urban trips including work trips (Fadare, 1997). However, the New Urbanism Model seems to lend some credibility to the undifferentiated land-use patterns in African cities where many activities are clustered together within walking distance, interconnected by a system of street networks specifically designed to encourage walking and reduce the number and length of automobile trips (Congress for the New Urbanism, 2002).

The intra-urban movement pattern generally vary from one location of the city to another while the spatial pattern of movement differs in volume and scale of urban travels as a result of factors which include; the spatial distribution of land uses, the socio-economic characteristics of urban residents, the population and density of urban center as well as density of residential land use.

Okoko and Fasakin (2007) explain transportation as an integral part of the functioning of any society and advances in transportation have made possible changes in the way we live, societies organization, growth of economy and serves as a catalyst to rapid national development. Adedotun (2015) indicated significant relationship between socio-economic characteristics of resident and the travel pattern in South West Nigeria. Ibrahim et al. (2017) examined the socio-economic characteristics of urbanites and travel pattern across six cities in Nigeria where 96% of the variability in the observed travel pattern was determined by the level of socio-economic characteristics of the urban resident. In examining the intra-urban transportation and gender travel behavior in Ilorin, Ibrahim (2012) observed that poorly maintained transport infrastructure, inadequate facilities, accidents, waiting for long periods at bus stops, traffic congestion and related parking problems determined gender travel behaviour in Ilorin. Likewise, Adetunji, (2011) examined urban spatial structure and work trip patterns in south-western Nigeria and concluded that a greater spread of socio-economic facilities would enhance accessibility, reduce the pressure on main transport arteries in cities. Socio-economic variables and operational characteristics were determining factors for the patronage of public transport. Yakubu (2014) revealed that motorcycle is the most dominant means of urban transportation as a result of its flexible, fast, and easy to come by within the city.

This study therefore attempts to evaluate intra-urban resident trip pattern, with the use of GIS in mapping out the interaction of different household trips within the study area.

Methodology

The Study Area

Osogbo falls within latitude 7°46'N, longitude 4°34'W and latitude 7.767°N, longitude 4.567°E. The city is situated on a raised land which is well over 500 meters above sea level (Figure 1). The landscape is dissected by many principal rivers which are Osun,

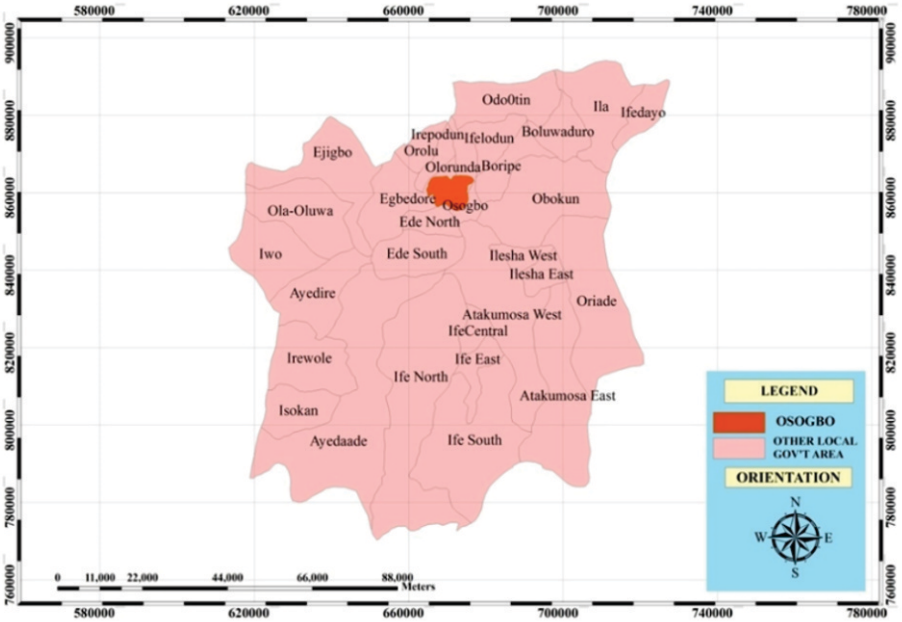

Figure 1: Osogbo within Osun State

Okoko and Erinle Rivers. The railway that goes from Lagos to Kano passes through Osogbo. The indigenous occupations of the people of Osogbo are crafting and dyeing which are entirely different from the predominant farming that is common in Southwestern Nigeria. The cottage industry is often established in homes and compound courtyards where craft making, weaving of cloth "*asooke*" and dyeing of cloths take place.

Data Collection

The study examines residents' intra-urban trip patterns in Osogbo, Nigeria. Data on respondents' mode of transport, reasons for choosing the mode and their movement patterns were obtained from 285 randomly selected respondents. Essentials of movement pattern measured in this study are the trip purposes which are: works, business, schools, religion, social, recreation and others. Different mode of transport used in the area are: motorcycle, tricycle, mini-bus popularly known as*korope* and private car for different purposes. The mini bus usage is dominant in Isale-Osun and Ojo-Oba area as a result of the presence of the traditional market and they made up the core area of the city occupied by the low-income earners.

Multistage sampling technique was used to select six political wards in Osogbo to form where the respondents of the study in the two Local Government Areas of Osogbo were selected. Information on the pattern of movement within the city were obtained by means of structured questionnaire and oral interview. The total number of 285 copies of questionnaire was administered to the households in the six selected wards as:Oja-Oba (64 respondents) and Isale-Osun with (85 respondents), Ayetoro (25 respondents) and Alekuwodo (73 respondents), Oke-Oniti (23 respondents) and Power-line (15 respondents) respectively.

Random sampling technique was adopted in administration of questionnaire in each of the selected wards to the household head. Data collected were analyzed using descriptive statistics such as frequency and percentage while GIS mapping was used to analyze the movement pattern with the use of trip generation map to show the various patterns of movement of the intra urban residents of the study area.

Results and Discussion

This section presents the results of the preferred mode of transport, reasons for using the modes and patterns of movement of the respondents during the weekend in the study area and discussed accordingly.

Table 1 shows that mini bus usage is dominant in Isale-Osun, Ayetoro and Ojo-Oba as a result of the commercial activities that dominated the area. These are the traditional core areas of the city, although, Isale-Osun and Ojo-Oba are occupied by the low-income earners. The use of motorcycle and tricycle as amode of inter urban movement is common in Oke-Oniti as a result of non-availability of mini bus plying the area.

Table 2 shows the different mode of transport in the study area. 116(40.7%) respondents preferred mini-bus while 90 respondents preferred motor-cycle as against 37that usetricycleto reach various places.

Table 1: Preferred mode of transport,

Name of Locality	Motorcycle	Tricycle	Mini- bus	Private car	*Total*
Isale-Osun	25 (29.4%)	10(11.8)	30 (35.3%)	20(23.5%)	***85 (100%)***
Powerline	4 (26.4%)	2 (13.3%)	5 (33.3%)	4 (26.7%)	***15 (100%)***
Ayetoro	7 (28%)	3 (12%)	10 (40%)	5 (20%)	***25 (100%)***
OkeOniti	10 (43.5%)	7 (30.4%)	4 (17.4%)	2 (8.7%)	***23(100%)***
Alekunwudo	12(16.4 %)	9 (12.3%)	25 (34.3%)	27 (37%)	***73 (100%)***
Ojo-Oba	19 (29.7)	6 (9.4%)	23(35.9%)	16 (25%)	***64 (100%)***

Source: Authors' Field Survey (2020)

Table 2: Age Range and Preferred mode of Transport

Age	Motorcycle	Tricycle	Mini-bus (*korope*)	Private car	*Total*
20 below	1 (1.1%)	-	3 (2.6%)	-	*4 (%)*
21-30	21(23.3%)	3 (8.1%)	24(20.7%)	2 (4.8%)	*50 (17.5%)*
31-40	36 (40.0%)	10 (27%)	51(44.0%)	18 (42.8%)	*115 (40.4%)*
41-50	17 (18.9%)	9(24.3%)	23 (19.9%)	9(21,4%)	*58 (20.4%)*
51-60	11 (12.2%)	8(21,7%)	8 (6.8%)	9 (21.4%)	*36 (12.6%)*
60 above	4 (4.4%)	7(18.9%)	7 (6.0%)	4 (9.5%)	*22 (7.7%)*
Total	90 (100%)	37(100%)	116 (100%)	42 (100%)	***285 (100%)***

Source: Authors' Field Survey (2020)

Most respondents who preferred motorcycle and small bus are within the ages of 31-40 years due to their flexibility and ability to ply narrow and rough roads. This age range of 31-40 yearsdominated the total transport modewith 115 (40.4%) in the areafollowed by age rangeof 41-50 years with 58 (20.4%), while the age range of20 and below has least with4 (1.4%) respectively.

Table 3 shows various reasons for choosing different modes of transportby respondents which include time saving, availability of mode, conveniences, affordability and efficiency. The most preferred mode of transport in the study area is mini-bus (korope) due to its availability and convenience. In Isale-Osun for instance (see Table 1),40%of the respondents use korope because it saves time, 33.3% use it in Power line area as a result of its availability, 28.8% use it in Alekuwodo for its convenience, while in Oke-Oniti, 13% use it due to its availability.

Table 4 shows the pattern of trip for various purposes during the week and the highest trip generated according to locality. Tripmade for recreation/ tourism generated the highest movement pattern in Isale-Osun with 29.4% while in Power-line, business/work generated the highest movement pattern with 40%. In Ayetoro, school trip recorded the highest with 24% whereas, in Oke-Oniti and Alekunwodo business/work trip which generated 34.8% and 26% respectively while in Oja-Oba, religious trip dominated with 25%. Notable religious centers in the area are Oja-Oba Central Mosque, Nasrul-Lahi-li-Fathi Society (NASFAT) at Ring

Table 3: Reasons of choosing the preferred mode of transportation

Locality	Frequency (%)				
	Time saving	**Availability**	**Convenience**	**Efficiency**	***Total***
Isale- osun	34 (40%)	10 (11.8%)	17 (20%)	24 (28.2%)	***85 (100%)***
Power line	3(20%)	5(33.3%)	4 (26.7%)	3(20%)	***15 (100%)***
Ayetoro	6 (24%)	7 (28%)	8 (32%)	4 (16%)	***25 (100%)***
Oke-oniti	5 (21.8%)	3 (13%)	9(39.1%)	6 (26.1%)	***23 (100%)***
Alekuwudo	17(23.3%)	20 (27.4%)	21(28.8%)	15 (20.5%)	***73 (100%)***
Oja-oba	18(28.1%)	21 (32.8%)	14(21.9%)	11 (17.2%)	***64 (100%)***

Source: Authors' Field Survey (2020)

Table 4: The proportion of weekly trips for various purposes in Osogbo

Locality	Frequency (Percentage)								
	Business/ work	**School**	**Shopping**	**Recreation/ Tourism**	**Religion**	**Health**	**Social**	**Visitation**	***Total***
Isale- osun	10 (11.8%)	4 (4.7%)	-	25 (29.4%)	22 (25.9%)	8 (9.4%)	10 (11.7%)	6 (7.1%)	***85 (100%)***
Power line	6 (40 %)	2 (13.3%)	-	-	1 (6.7%)	3 (20%)	1 (6.7%)	2 (13.3)	***15 (100%)***
Ayetoro	4 (16%)	6 (24%)	2 (8%)	5 (20%)	3 (12%)	-	2 (8%)	3 (12%)	***25 (100%)***
Oke-oniti	8 (34.8%)	2 (8.7%	1 (4.4%)	1 (4.4%)	5 (21.7%)	-	3 (13.0%)	3 (13.0%)	***23 (100%)***
Alekuwodo	19 (26%)	12 (16.4%)	13 (17.8%)	9 (12.3%)	3 (4.1%)	5 (6.9%)	7 (9.6%)	5 (6.9)	***73 (100%)***
Oja-oba	14 (21.9%)	3 (4.6%)	11 (17,2%)	11 (17.2%)	16 (25%)	-	9 (14.1%)	-	***64 (100%)***

Source: Authors' Field Survey (2020)

Table 5: Pattern of Weekend Movement

Name of locality	Frequency (%)			
	Religious Centre	**Recreational**	**Shopping**	***Total***
Isale-Osun	65 (31.7%)	20 (26.7%)	-	***85 (29.8%)***
Power Line	11 (5.4%)	4 (5.3%)	-	***15 (5.3%)***
Ayetoro	18 (8.8%)	7 (9.3%)	-	***25 (8.8%)***
Oke-Oniti	12 (3.9%)	11 (14.7%)	-	***23 (8.1%)***
Alekuwodo	49 (23.9%)	23 (30.7%)	1 (20.0%)	***73 (25.6%)***
Oja-Oba	50 (24.4%)	10 (13.3%)	4 (9.4%)	***64 (22.5%)***
Total	***205 (71.9%)***	***75 (26.3%)***	***5 (1.8%)***	**285 (100%)**

Source: Authors' Field Survey (2020)

Road for the Muslim, Osun Groove for the traditional worshippers and churches which are located in every nook and cranny of the city for the Christian activities. Social functions to wedding and other ceremonial functions in most cases are fixed for weekend that generates many trips.

Table 5 shows weekend movement pattern of respondents in the study area. Osogbo is a city with high level of patronage to the different religious centres. Isale-Osun and Oja-Oba have the highest visit to religious centers with 65 (31.7%) and 50 (24.4%) respondents respectively. The level of visit to recreational is very low in Power Line and Ayetoro with 5.3% and 9.3% respectively.Mostof the shopping activities are done during week in Isale Osun, Power Line, Ayetoro and Oja-Oba. Only Alekuwodo area recorded 20.0% shopping trip during the weekend. The study confirms the work of Ibrahim (2012) and Adedotun (2015) on the urban transport movement pattern. Generally, the temporal pattern of activities on weekend particularly Saturday and Sunday are different from those on weekdays. On weekend, especially on Saturday, entertainment and shopping constitute a large

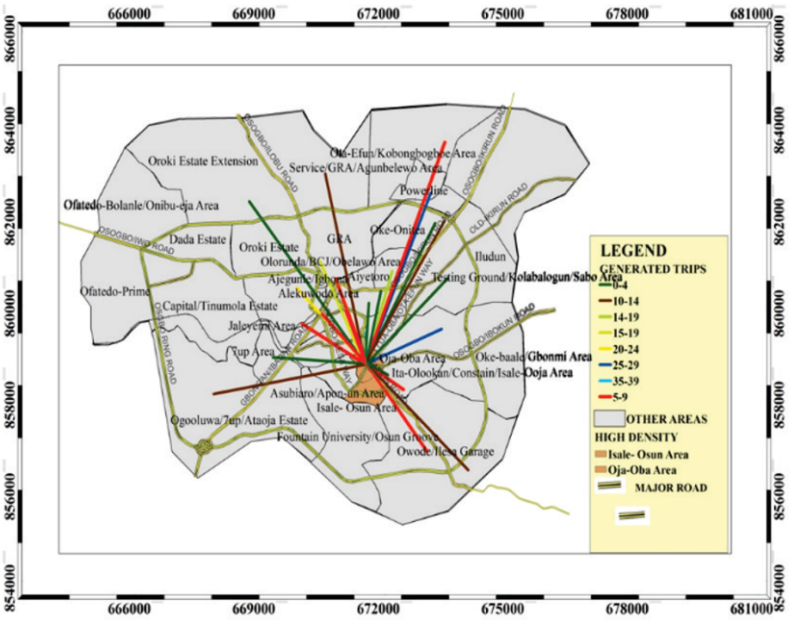

Fig. 2: Respondent Movement Pattern in Osogbo

Table 6: Residents' Satisfaction with Intra-urban Movement Mode

S/N	Variables	`Rating					NR	SMV	MWV	Rank
		1	2	3	4	5				
		HD	D	FS	S	HS	F			
1	Waiting time	22	48	309	80	30	175	489	2.79	8
2	Conditions of mode	15	50	291	228	30	200	614	3.07	7
3	Drivers' behaviour	10	34	357	168	210	198	619	3.12	5
4	Crowding	7	60	294	196	55	196	612	3.12	5
5	Cleanliness of vehicle	6	56	318	172	60	196	612	3.12	5
6	Ease of entering mode	5	52	318	204	35	196	614	3.13	4
7	Journey time	9	50	345	144	60	198	608	3.07	7
8	Seat comfort	5	52	360	148	50	199	615	3.09	6
9	Cost of travel	8	46	315	204	40	196	613	3.12	5
10	Safety and security	7	54	282	220	50	194	613	3.15	2
11	Reliability	6	44	312	232	30	197	624	3.16	1
12	Lack of bus stop	199	16	99	56	30	261	400	1.53	10
13	Level of customer service	6	48	375	105	10	193	544	2.18	9
14	Appearance of vehicle	4	44	312	244	5	193	609	3.15	2
15	Service information	4	54	00	240	15	195	613	3.14	3
	Total								43.94	

Mean score of ∑MWV/n = 43.94/15 = 2.93

HD= highly dissatisfied, D= dissatisfied, FS= fairly satisfied, S= satisfied, HS= highly satisfied

NR= Number of Respondents, SWV= Summary Weight Value and MWV= Mean Weight Value

proportion of the trip purposes while on Sunday, religious activities dominate the movement pattern as many worshipers travel from far and near areas of the city to converge at their different worship centres. Hence, there are more taxi trips on Saturday and Sunday while the number of trips to and from work is relatively low.Figure 2 shows respondent movement pattern in Osogbo.

Table 6 shows the response of the respondents' level of satisfaction on the mode of intra-city movement in the study area. It was observed that reliability satisfaction of intra- city movement of the respondents has the highest mean weighted value of 3.16 and implies that the respondents considered reliability of mode of transport to be highly satisfied. Appearance of vehicle as well as safety and security were rated next to reliability satisfaction at 3.15 respectively. This implies that the respondents were satisfied with the appearance of the vehicle, safety and security of mode of transport. It was noted that most respondents rated crowding as fairly significant at 3.12. While waiting time, and lack of bus stop were rated at 2.79, and 1.53 respectively, this may be as a result of lack of bus stop which brings about schedule in travel time within the area. The travel characteristics and satisfaction of intra-city movement in the study area indicated that the variables with a mean weighted value which is above the mean score of 2.93 were considered satisfying enough and those below the mean score should be improved on to achieve better transport facilities.

The resident's movement patterns in the study area were determined by the concentration of activities in certain location. For instance, Oja-Oba area comprise of the: palace, palace market, central mosque and other ancient land marks of the town as it also serves as link to different location in the town.These have generated a lot of traffic and street parking along the road corridor. The area lacks designated bus-stops which hindered the free flow of traffic in the study area as the commercial transport mode could stop anywhere and pick passengers at will, resulting to on-street parking.

Conclusion

The study revealed that the residents travel to different activity areas within the town using public transport such as korope, tricycle and motorcycle and tricycle. Lack of designated bus-stops hindered the free flow of traffic in the study area as commercial mode stop and pick passengers at will resulting to on-street parking. This study recommends the need for city manager and planners to ensure adequate mass transit bus services which could convey large number of commuters to different locations particularly along the route that link the major road and for effective and efficient public transport system. In order to diffuse the flow of traffic in the city, there should be a deliberate policy by the city planners to relocate some high trip generating activities to areas where there are less activities. There is need for provision of adequate bus-stop to ease parking of the mini-bus and other mode of transport within the study area.

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