Research Article
Socio-economic Determinants of Intra-urban Trips Generation in Ogun State, Nigeria

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Abstract: The focus of this study is on the significance of Socio-economic characteristics of residents on intra-urban travel in Ogun State, Nigeria. 1507 households were randomly sampled across the 14 urban centres in the state and information on intra-urban trip generation and 12 socio-economic variables in respect of them were collected. The multiple regression technique was used to establish the influence of socio-economic variables on intra-urban trip generated by households. The number of significant socio-economic determinants of intra-urban trips ranges between 2 and 8, while the proportion of the criterion (trip generation) explained by the predictors (socio-economic variables) ranges between 35.80 an 81.70% across the urban centers. The more developed urban centers have higher number of socio-economic determinants of trip than the less developed ones. On the other hand, the magnitude of criterion explained by the socio-economic variables is higher on the less developed urban centres. At regional setting, 8 out of 12 socio-economic variables namely: Number of workers, Age, Mode of travel, Sex, Occupation, Length of stay, Rent and Income significantly explained 46.10% of variation in criterion. This suggests the need to include variables on socio-economic development of cities in future research on intra-urban travel.

Keywords: Intra-urban, Nigeria, socio-economic determinants, trip generations, trip characteristics, urban centre

INTRODUCTION

Cities all over the world are characterized by a set of activities, which actually account for the concentration of people in them. Such activities are distinctively urban and include those arising from manufacturing, trading and finance, transportation and tertiary activities. All these combine to generate the spatial configuration of the city because their requirements are sometimes functionally differentiated and also spatially segregated. The spatial segregation of urban land use types creates spatial imbalance and this necessitates spatial interaction for functional interrelationships.

The urban centre of today is complex in nature, covers large expanse of land and accommodates varied activities (Hoyle and Knowles, 1998; Aderamo, 2004; Osoba, 2011; Raji, 2013). An outcome of this is that urban centre generates and attracts very large number of person trips daily.

Intra-urban travel represents an expression of an individual's behavior and as such it has the characteristics of being habitual. As a habit, it tends to be repetitive and the repetition occurs in definite pattern (Bruton, 1975). Studies (Ayeni, 1974; Adeniyi, 1981; Ojo, 1990; Ogunsanya, 2002; Solanke, 2005; Osoba, 2011; Badejo, 2011; Raji, 2013) have shown that in general, people tend to travel in order to obtain access to a variety of other peoples' services and facilities that are not available at the origins of their journeys.

In urban travel studies, evidences really abound supporting the effects of households characteristics on travel behavior. However in the previous works, emphasis is concentrated on one city at a time, thereby concealing the much desired variation in the phenomenon between cities. In other words, while the effects of socio-economic characteristics of people in urban travels are fairly well known at individual city level, the phenomenon is yet to be well established at regional setting especially in developing world.

The focus of this study therefore is on the significance of socio-economic characteristics of residents on intra-urban travel both at individual city level and regional setting in Ogun state of Nigeria.

LITERATURE REVIEW

Travel pattern studies within the urban centres have long attracted the attention of researchers in the field of travel behavior. Since the early 1970's, researchers have shifted their focus away from the traditional studies of purpose and modes of intra-urban travel to those that can adequately capture the processes underlying observed travel patterns in the light of the existing technology and contemporary planning process. Thus, studies since this period have been concerned with explaining how and why individuals distribute their trips from one or more given origin points.

The early works of Kansky (1967), Harton and Hultquists (1971) and Oppehoum (1975) on travel behavior employed multiple measures of travel pattern although none of these systematically related the travel pattern to personal attributes of the traveler. Perhaps the shortcomings of the earlier works prompted researchers like Hanson and Hanson (1981) and Oyesiku (1990) to devote more attention to the relationship between socio-economic and demographic characteristics of residents within the urban centres.

Traditionally, several studies have been done on the relationship between socio-economic status and travel behavior using Surrogate measures like occupation, income, education level and auto-ownership amongst others (Bruton, 1975; Ayeni, 1979; Oyesiku, 1990, Kuppan and Pendyala, 2000).

Households with more than one motor vehicle tend to generate more trips per unit than households with only one motor vehicle; the occupation of head of the household is seen as one of the major indicators of the standard of living enjoyed by the family and reflects to a certain extent the family income. The ability to pay for a journey affects the number of trips generated by a household. Families with a high income can generally afford to satisfy more of their movement demands than low-income families. As one would expect therefore, increasing family income leads to greater trip production.

Family income is also said to be related to levels of motor vehicle ownership. A general conclusion from the above is that the travelers social and economic status can impose constraints on him/her within the urban area.

Goeverden and Hilbers (2001) noted that personal characteristics of the traveler influence his demands upon quality and his willingness to pay. In the same manner, it has been established that households with higher income make more trips and travel greater distance (Ayeni, 1974). Also according to Kansky (1967) and Doubleday (1977), auto owners and the non-educated people make more trips than non-owners and the more educated when all trips are considered. Olayemi (1977) observed that apart from variation in both time and space, various socio-economic factors combine to determine why, where, when and how of movements in metropolitan Lagos, Nigeria. In a similar perspective, Ogunjumo (1986) using the regression analysis observed that the trip frequencies in Ife, Nigeria are affected by household size, number of workers per household and vehicle ownership. Just like Olayemi (1977) the study could not reveal the variation across cities because of its focus on a single urban centre.

In a nutshell from the above, the significance of socio-economic characteristics of respondents in intra-urban travel cannot be overemphasized. However, concentration of previous works on one city at a time concealed the much-desired variation between cities and thus constitutes a gap in knowledge of urban travel studies. Attempt in this article is to contribute towards an existing gap in knowledge of urban travel by establishing the influence of socio-economic characteristics of urban residents on intra-urban travels at a regional setting choosing Ogun State of Nigeria as a case study.

METHODOLOGY

This study is on socio-economic characteristics of residents and trips generated within urban centres. An urban centre is defined as the settlement with a total population of 20,000 people or more in conformity with the United Nations and the definition of urban centre in the Nigeria National Population Census of 1963 and 1991. Based on this definition, there are 22 urban centres in the state. 14 of these in different categories (such as large, medium and small) of urban centres in terms of population sizes were randomly selected. They are: Abeokuta, (the state capital), Ijebu-Ode, Sagamu, Ilaro, Ago-Iwoye, Ota, Ijebu-Igbo, Ayetoro, Ifo, Iperu, Ado-Odo, Idi-Iroko, Owode-Yewa and Alagbado.

A household survey was conducted in each of these urban centres to generate data for this study. Towards the survey, each urban centre was divided into residential quarters along the demarcation of the town into residential neighborhoods by the zonal Town Planning Authorities (ZTPA). In each of the neighborhoods, random selection of streets and systematic sampling of the housing unit were made. The size of the household sample interviewed was based on the estimates for each urban centre. There were about 269,095 households in all the selected urban centers out of which 1,507 were sampled in proportion to the number of households in each city (Table 1). 1,300 fully completed copies of the questionnaire were used in this study. The questionnaire dealt among others with socio-economic characteristics of residents and trips generated in each urban centre.

Table 1: Selected urban centers in Ogun state, estimated number of households and sample sizes

S/No	Urban centre	Estimated number of households	Household sample size
1	Abeokuta	89,263	500
2	Ijebu-ode	31,459	176
3	Sagamu	32,268	181
4	Ilaro	9,850	55
5	Ago-Iwoye	7,498	42
6	Ota	26,149	146
7	Ijebu-Igbo	16,430	92
8	Ayetoro	7,633	43
9	Ifo	13,273	74
10	Iperu	5854	33
11	Ado-odo	5,830	33
12	Idi-Iroko	4,654	26
13	Owode	9,958	56
14	Alagbado	8,976	50
Total		269,095	1, 507

Estimates extracted from ministry of finance and economic planning (statistics division) Abeokuta, Ogun State

In this study, socio-economic characteristics are used to refer to social and economic status of the households.

Following the works of Ayeni (1974), Kansky (1967), Ogunjumo (1986), Olayemi (1977), Oyesiku (1990), Mistral and Bhat (2000), Kuppan and Pendyala (2000), Solanke (2005) and Raji (2013) among others, multiple item indices were used to measure socio-economic status of the respondents. These are: sex, age, marital status, educational level, occupation, occupational category, monthly income and automobile/vehicle ownership.

Other important measures considered as potentials of household trip generation in this study are: length of stay, number of workers, mode of travel and estimated annual rent paid. The annual rent paid is considered here as another measure of economic power aside income as previous studies have shown that in survey research, respondents often inflate incomes for ego boosting or deflate them for tax evasion.

In all, twelve socio-economic characteristics of households are considered important measures of travel behavioral pattern and determinants of trip generation.

Multiple regression technique is employed in this analysis. The stepwise version of the model was used because it derives the best regression equation from a set of explanatory parameters in a step-by-step version. According to Hauser (1974), the stepwise regression model is a search procedure, which identifies the independent variable, which possesses the strongest relationships with the dependent variable. The model thus helps to eliminate such independent variables that do not make any meaningful contribution to the explanation of the dependent variable.

The explanatory variables are considered one after the other on the basis of their partial correlation with the criterion (dependent) variable. The independent variable which exhibits the highest partial correlation with the criterion is considered first in the regression equation while the one with the greatest proportion of the residual variance is considered next.

At every stage of the analysis, a significant test is carried out using 'f' and 't' test statistics to ascertain the reliability of the variance that is contributed by any newly entered independent variable in the overall relationship. The outcome of the analysis is presented next.

RESULTS

The socio-economic determinants of trips generated vary both in number and magnitude among urban centres. As shown in Table 2, there are some characteristics that contribute significantly to the criterion in some urban centers and not in others.

The number and proportion of significant socio-economic variables in each urban centre is as follows: Abeokuta, 6(50%), Ijebu-ode 4 (33.33%), Sagamu 7 (58.33%), Ilaro 3 (25%), Ago-Iwoye 3 (25%), Ota 8 (66.67%) Ijebu-Igbo 3 (25%), Ayetoro 3 (25%), Ifo 3 (25%), Iperu 2 (16.67%), Ado-odo 3 (25%), Idi-Iroko 2 (16.67%), Owode 4 (33.33%), Alagbado 4 (33.33%).

The pattern of significant socio-economic variables shows that the more developed urban centers like Abeokuta, Sagamu and Ota have higher number of significant Socio-economic determinants than the less developed cities like Ilaro, Iperu, Idi-Iroko among others. The magnitude of explanation of criterion (trip generated) provided by significant socio-economic variables varies among the urban centres. It ranges between 35.80% for Ijebu-Igbo and 81.70% for Owode. Others are Abeokuta (53.80%), Ijebu-Ode (53.30%), Sagamu (59%), Ilaro (66.30%), Ago-Iwoye (53.90%), Ota (58.50%) Ayetoro (53.10%), Ifo (50.80%), Iperu (68.70%), Ado-Odo (68.90%), Idi-Iroko (58.60%) and Alagbado (73.30%) Table 2 and Fig. 1.

The magnitude of significant variables reveals different patterns from the number of significant variables, across the cities. While the more developed urban centers like Abeokuta, Ijebu-ode, Sagamu and Ota have higher number of significant socio-economic determinants of trips, the less developed ones like Iperu, Ado-odo, Owode and Ilaro account for higher proportion of magnitude of significant variables. This shows that socio-economic characteristics of residents provide a higher explanation of trip generated in emerging urban centers of Ogun state, Nigeria than in the much more developed cities. In other words, at the early stage of urban status, socio-economic characteristics of urban residents provide a higher
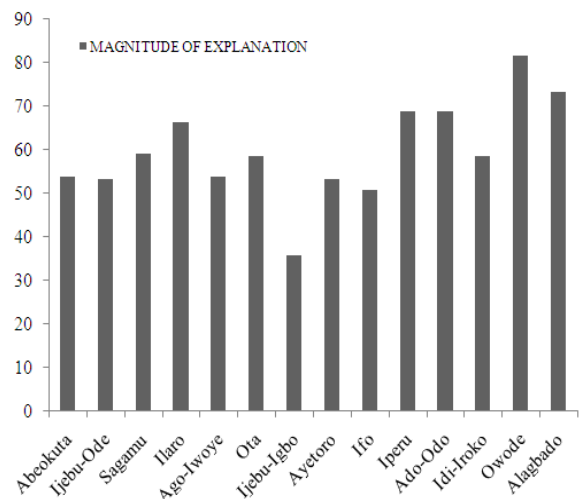

Fig. 1: Magnitude of explanation of trip generated by significant socio-economic variables among urban centres

Table 2: Summary of multiple regression results: Socio-economic variables and intra-city trips generated by urban residents of Ogun State, Nigeria

Urban centre	Significant variables	Level of explanation (%)	b coefficient	F value of the equation	T value for variables	Cumulative level of explanation	
Abeokuta	No of workers	37.70	8.795	258.360**	16.074**	37.70	No of cases: 429
	age rent	6.900	6.883	171.574**	7.294**	44.60	**: significant at
	occupation	4.900	0.144	138.986**	6.429**	49.50	0.01 level
	length of stay	2.600	-7.537	115.205**	4.758**	52.10	
	income	0.800	2.345	94.974**	2.693**	52.90	
		0.900	2.708	82.001**	2.933**	53.80	
			Constant = 13.337				
Ijebu-ode	No of Workers	30.30	9.574	65.078**	8.067**	30.30	No of cases: 152
	Age	17.70	8.127	68.782**	7.131**	48.0	**: significant at
	Rent	3.600	0.143	52.491**	3.291**	51.60	0.01 level
	Auto-ownership	1.700	3.238	29.992**	2.344*	53.30	* : significant at
			Constant = 13.048				0.05 level
Sagamu	Age	30.10	13.138	66.842**	8.176**	30.10	No of cases: 157
	income	14.90	10.033	63.094**	6.463**	45.0	**: significant at
	marital status	4.400	12.646	49.842**	3.644**	49.40	0.01 level
	sex no of workers	5.700	10.190	46..575**	4.370**	55.10	* : significant at
	education	1.300	3.762	29.502**	2.126*	56.40	0.05 level
	mode of travel	1.400	3.069	27.203**	2.289*	57.80	
		1.200	3.116	25.208**	2.083*	59.00	
			Constant = 25.678				
Ilaro	Income	55.00	19.933	56.122**	7.491**	55.00	No of cases: 48
	No of worker	7.600	3.762	37.581**	3.021**	62.60	**: significant at
	length of stay	3.700	5.859	28.908**	2.226*	66.30	0.01 level
			Constant = 17.733				* : significant at
							0.05 level
Ago-Iwoye	No of worker	31.30	8.735	15.490**	3.936**	31.30	No of cases: 36
	Occupation	11.90	-11.004	12.567**	2.634**	43.20	**: significant at
	category	10.70	22.680	12.454**	2.715**	53.90	0.01 level
	education		Constant = 17.102				
Ota	No of worker	36.30	6.766	71.166**	8.436**	36.30	No of cases: 127
	length of stay	6.300	6.221	45.982**	3.690**	42.60	**: significant at
	age occupation	3.600	4.634	35.193**	2.871**	46.20	0.01 level
	category	3.300	4.516	29.906**	2.832**	49.50	* : significant at
	marital status						0.05 level
	sex occupation	2.600	13.190	26.319**	2.557**	52.10	
	rent	2.300	7.029	23.868*	2.467*	54.40	
		2.600	-8.543	22.544**	2.683**	57.00	
		1.500	0.086	20.808**	2.072*	58.50	
			Constant = 18.864				
Ijebu-Igbo	Age	22.30	20.655	22.341**	4.727**	22.30	No of cases: 80
	No of worker	8.200	6.091	16.871**	3.014**	30.50	**: significant at
	Education	5.300	10.300	14.110**	2.505**	35.80	0.01 level
			Constant = 25.917				
Ayetoro	Age	37.30	15.405	20.825**	4.563**	37.30	No of cases: 37
	Rent	8.600	0.290	14.419**	2.323*	45.90	**: significant at
	No of worker	7.200	4.126	12.475**	2.260*	53.10	0.01 level
			Constant = 24.500				* : significant at
							0.05 level
Ifo	No of worker	43.50	8.572	47.702**	6.907**	43.50	No of cases: 64
	Income	3.500	5.006	27.044**	20.011*	47.00	**: significant at
	Length of stay	3.800	5.043	20.692**	2.169*	50.80	0.01 level
			Constant = 13.516				* : significant at
							0.05 level
Iperu	No of worker	57.50	7.466	33.844**	5.818**	57.50	No of cases: 27
	Length of stay	11.20	7.625	26.362**	2.932**	68.70	**: significant at
			Constant = 14.111				0.01 level
Ado-Odo	Marital status	32.40	27.417	11.989**	3.462**	32.40	No of cases: 27
	Occupation	31.00	-27.667	20.747**	4.502**	63.40	**: significant at
	Mode of travel	5.500	-9.118	17.018**	2.034*	68.90	0.01 level
			Constant = 35.00				* : significant at
							0.05 level
Idi-Iroko	No of worker	39.10	10.893	14.154**	3.762**	39.10	No of cases: 24
	Auto-ownership	19.50	18.794	11.581**	3.261**	58.60	**: significant at
			Constant = 8.182				0.01 level
Owode	No of worker	63.60	10.561	80.575**	8.973**	63.60	No of cases: 48
	Age	12.20	10.952	70.293**	4.741**	75.80	**: significant at
	Occupation	3.900	6.1905.40	57.466**	2.910**	79.70	0.01 level
	category	2.000	Constant = 9.828	47.850**	2.159*	81.70	* : significant at
	Income						0.05 level

Table 2: Continue

Urban centre	Significant variables	Level of explanation (%)	b coefficient	F value of the equation	T value for variables	Cumulative level of explanation	
Alagbado	Income	33.40	15.973	21.072**	4.590**	33.40	No of cases: 44
	Occupation	26.20	-14.806	30.259**	5.158**	59.60	**: significant
	category	8.000	10.426	27.785**	3.134**	67.60	at 0.01 level
	Sex	5.700	8.731	26.826**	2.905**	73.30	
	Education		Constant = 34.964				
Overall/state	No of worker	36.00	8.984	729.635**	27.012**	36.00	No of cases:
Level	Age	5.700	6.957	463.842**	11.273**	41.70	1300
	Mode of travel	1.700	3.641	330.735**	6.165**	43.40	**: significant
	Sex	1.200	4.235	260.157**	5.277**	44.60	at 0.01 level
	Occupation	0.600	-3.432	213.642**	3.750**	45.20	* : significant at
	Length of stay	0.400	1.840	180.192**	3.031**	45.60	0.05 level
	Rent	0.300	0.050	156.365**	2.778**	45.90	
	Income	0.200	1.320	137.662**	2.035*	46.10	
			Constant = 14.529				

Table 3: Frequency of the significant predictors in the regression equations for the study area

S/No	Variables	Frequency of entry
1	Sex	4
2	Age	8
3	Marital status	3
4	Occupation	4
5	Occupation category	4
6	Education level	4
7	Length of stay	6
8	Income	7
9	Rent	5
10	Auto ownership	2
11	Mode of travel	3
12	Number of worker	13

explanation of trips generated; but as the urban centre develops further, the influence of socio-economic characteristics of residents, reduces in magnitude as determinants of trip generation. This suggests existence of other factors aside socio-economic characteristics of residents affecting urban trip generation as the urban centres advance in growth and development. There is therefore the need to include level of socio-economic development of urban centres in future research on intra-urban travel behavior.

The frequency at which each of the explanatory variables entered into the regression equations is shown in Table 3 and worthy of consideration. If the frequencies can be taken as an indication of the importance of the variables, then, number of workers per household is the most important. This is followed by age, income, length of stay and rent in that order. Other variables follow as shown in the table.

CONCLUSION

The influence of socio-economic characteristics of households in urban trip generation is examined in this study. The socio-economic determinants of trips generated vary in magnitude and number from one urban centre to the other in the state. The number of significant socio-economic determinants of trips in more developed urban centres like Abeokuta, Ijebu-Ode, Sagamu and Ota is more than in the less developed ones like Ilaro, Iperu, Idi-Iroko among others.

Also, as shown in this study, the level of explanation of criterion provided by significant socio-economic variables varies among urban centres. The socio-economic characteristics of residents are more effective as determinants of urban travel behavior in emerging urban centers than the more developed ones. This as earlier suggested implies other factors aside socio-economic characteristics of residents affecting trip generation. In this regard, the influence of spatial attributes of urban centers has been suggested for consideration for further study in urban trip generation.

In the light of this finding, travel behavior in urban centres should be monitored on continuous basis. At the initial stage of development, socio-economic characteristics of residents should be given due consideration. However, as city develops further, other factors such as physical features/components should be given consideration in an attempt to understand and adequately plan for efficient urban travel.

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