MNK Publication

FACTORS INFLUENCING INTER-CITY TRIP GENERATION IN IFO LOCAL GOVERNMENT AREA OF OGUN STATE, NIGERIA

Dr.Aworemi,J.R[1],Ajayi J.O[2]
Department of Transport Management Faculty of Management Science ,
Ladoke Akintola University of Technology,Ogbomoso, Nigeria
E-mail: aworemi_remi@yahoo.com
Tel: +2348033967307

Abstract – Trip generation is widely used for forecasting travel demands. It predicts the trips originating in or destined for a particular traffic analysis zone. No doubt, the increase in demand for transport is a direct result of trip generating zones which are majorly households in many urban centers. This study investigates the prevalent socio-economic factors influencing trip generation in Ifo Local Government Area of Ogun state, Nigeria.
Data on socio-economic characteristics of 500 residents were collected and analysed using both descriptive analysis and simple Pearson Product Moment Correlation as the inferential statistical technique for testing the stated hypothesis.
The correlations co-efficient between trip generation and income of residents with a significant value of 0.000 at p<0.01 reveals that income is the most influential socio-economic factor on trip generation. Hence, the null hypothesis was rejected. This paper therefore proposed possible suggestions that are aimed at improving trips generated in the study area.

KEY WORDS: Trip, Round trip, Transport network, Passenger, Land use, Congestion, Travel time

I. INTRODUCTION

Transportation development across the world helps to improve the quality of life through the transportation system by providing for the mobility of people, goods, and services.

Transportation Planning is aimed at forecasting for efficient, effective, affordable, available and fast transportation system for future. Transportation planning ensures effective performance of existing transport service and provision for the future needs of transport systems for goods, services, and people. Transportation planning is important in order to provide location between geographical spaces and promote interaction between such spaces.

Trip generation is one of the processes of transport planning that examines the number of trip generated in an environment and factors that influences those trips. Trip generation can be defined by purpose of trip, time of trip, cost of travel, convenience of travel, frequency of trip, numbers of inter-change and the duration of trip. Typically, trip generation focuses on residences, and residential trip generation is thought of as a function of social and economic attributes of households. The increasing demand as a result of trip generation for transport over time has brought about certain transport challenges which necessitated an investigation into the cause of this demand which is largely the socio-economic characteristics of households.

For a sustainable transport system in any nation there is need for the transport of that nation to be planned so as to reduce the havoc cause by improper planning for the nation to be developed. Adeniyi (1987) revealed that pattern of urban movement are influenced by the size and density of settlement, topography, and length of journey, income and household characteristics. It is also emphasized that demand for transport and travel intensity (both of which influence trip generation) tend to increase sharply with the size of a city especially when the center or major areas of activity increase correspondingly in terms of both area and employment. Also Hanson and Schwab (1995) noted trip characteristics of travelers and nature of urban environment and transportation system need to shape the travel pattern.

This study aims to identify the certain factors that influence inter-city trip generation in the study area and to specifically evaluate the relationship between specific social economic characteristics of respondents and inter-city trip generated. Also, it examined these socio-economic factors that influence trip generation.

II. LITERATURE REVIEW

Transportation development has influenced the pattern of physical, economic and regional growth through the provision of access to land and to resources. However, the objective of efficient, effective, safe and comfortable transport system is to ensure equitable performance of the general transportation systems, this is in terms of the quality, quantity as well as the equity of the provision of transport services from one point of origin to another point of destination. Transportation planning plays a fundamental role in the comprehensive planning of the region and the community, this is because it includes strategic formulation of objectives and goals of transportation systems, it also involves basic evaluation process as well as equitable participation of general stakeholders that use the transportation systems. It further involves the collaborative efforts of all planning agencies as well as meaningful public involvement. Above all transportation planning is an overall

process that links physical, economic and social objectives of the state, city or the region at the national level.

Thus transportation planning ensures effective performances of existing transport services and provision for the future needs of transport systems for goods, services and people. Transport planning by meaning is the process involve in the evaluation assessment, projection, design and positioning of transport facilities that includes transportation lines, tram ways, seaport, airport terminals as well as pedestrian lanes. Transportation planning is also considered as a typical planning process that involves basic decision making process, particularly for data gathering, analysis, policy planning and innovations for new transportation system.

Spatial interaction in urban setting could be of at least two types namely: those that involve physical contacts like day-to-day movements of people and those that do not require such contact like telephoning. This is because they represent both a function and a process (Axhausen and Gariling, 1992).

Transportation is very vital to urban life because it is an absolutely necessary means to an end. It allows people to carry out the diverse range of activities that made up daily life (Filani, 1991, 1993). For the fact that cities consist of spatially separated, highly specialized land uses such as, banks, hospitals, libraries, schools and so on, people must travel if they want to obtain necessary goods and services.

Urban travel takes place when inhabitants of urban centers carry out their different activities in different places whether by necessity or by choice.

Ojo (1990) opined that people tend to travel in order to obtain access to a variety of other people, services and facilities that are not available at the beginning of their journeys. To what extent, how far and by what means they travel is a result of a complex interaction of socio-economic, political and physical factors (Adeniji, 1991). The nature and degree of influence of these factors however vary from city to city and even within a given urban centre (Bhat and Koppelman, 1999).

Typically, trip generation analysis focuses on residences, and residential trip generation which is thought of as a function of the social and economic attributes of households. At the level of the traffic analysis zone, residential land use "produce" or generate trips. Traffic analysis zones are also destinations of trips, trip attractors. The analysis of attractors focuses on nonresidential land uses.

Trip generation, consequent upon human travel is inevitable. It takes 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. In the time past, especially before the advent of modern transportation, the morphology of cities where dependent upon the mode of movement. In cities where there were canals, the structure was linear as water allowed easy interaction between one place and the other. In cities where this did not exist, the structure was essentially concentric as city plans were done in a way to minimize transport. Such cities had high densities of housing and population. Houses were multipurpose nature as they provided residences and workshops. Because of lack of mechanized transport, the early towns were small in size, intra-city mobility was low, restricted to short trek able distances and carrying of goods by head portage (Oyesiku,

2010). The city of today is no doubt very complex; covers large expanse of land and accommodates varied activities. One of the outcomes of this is the separation of urban land use components. Today, long distances are involved in inter urban movements; the mode of movement which was characterized by trekking in early period had been replaced by mechanical locomotion. It then becomes necessary for interaction to increase within urban centers. Hence, Socio-economic variables of urban centers constitute considerable potentials of trip generation.

The socio-economic and cultural growth of any nation can be measured through the efficiency of its transportation network and its judicious provision of telecommunication facilities. There exists a strong relationship between movement pattern and the location distribution of activities over geographic space (Goddard, 1970).

Fundamental to this relationship is the role and impact of telecommuting technologies such as the telephone (Clark, 1973). This relationship, however, is determined by certain underlying variables, which are neither similar nor transferable from the developed areas of the world to the developing areas, particularly, the African countries (Adeniji, 2000).

Clark (1973) recognized the geographical and socio-economic importance of communication flow and its role as agent of change within the spatial system. Family size was another significant factor explaining the variation in trip generation.

Another area worth considering in trip generation is **Telecommunication and Travel Behaviour.** The concept of telecommuting and travel gives a better understanding of the telecommunication technology in respect to transport. Conventional wisdom about social and economic behavior holds that the use of telecommunications is a natural substitute for transportation. For instance, telephone calls can replace travel to meetings and electronic messages can substitute for courier or postal delivery. Thus, the moving of information can replace the moving of people and goods.

Fadare (1989) studied socio-economic attributes and telecoms and found that, household size, employed members of household and monthly income are contributors to trip rates and telecoms usage. Thereby producing longer trip length in Ibadan; Oyesiku (1990) studied the inter-urban travel patterns of Ogun state urban centers and found that, there were statistical variations between the commercial, transition and residential zones of the study area in relations to telecommunications usages.

Fadare (2010) revealed that the use of telecommunications is a natural substitute for transportation; It is as a matter of resultant outcome rather than initial intent that telecommunications frequently substitute for transportation.

Agunloye (2013) examined the influence of mobile phone calls on travel pattern of airline transport passengers in Murtala Mohammed Airport Two (MMA2) Lagos, Nigeria using survey research method and found that there was a positive significant relationship between mobile phone calls and travel frequency in the study area.

Land use and transportation are mutually interconnected (Mitchell and Rapkin, 1952). The use of the term "land use" is based on the fact that through development, urban space accommodates a great variety of human activities. Land is a convenient measure of space, and land use provides a spatial

accounting framework for urban development and activities. The location of activities and their need for interaction creates the demand for transportation, while the provision of transport facilities influences the location itself.

Different land use types are found in metropolitan cities and each of them is unique and has its own propensity to generate not only trips but also dictate the pattern of development. Thus, transportation can be regarded as a land use factor in planning and development of cities. The rapid urbanization coupled with economic growth and forces of globalization across the globe means not only that more people than ever before will be living and working in cities but also that more people and more goods will be making more trips in urban centres, often over long distances (Zegras, 1997). The increase in spatial interaction between various land uses arising from increasing economic growth and urbanization as currently being experienced in Lagos makes urban transport planning and management a great challenge. This is because the movements generated within and between the land uses produce conflicts along major traffic corridors and activity centres.

Although the relationship between transportation and land use patterns has long been recognized, it is only recently that transportation been seen as a tool of land use planning rather than simply concomitant to it. In adopting transportation as a land use planning tool, it is essential to appreciate the scale of the complexity of movement within the city. This should follow at least two approaches; the first approach involves an examination of some determinants of trips at the household, firm or individual levels while the second is focused on the capacity of the various land uses to generate and attract trips (Ayeni, 1979). The outcome of many of these studies has influenced to a great extent several transport and land use planning decisions and policy issues in many countries of the world (Srinivasan, 2005).

III. METHODOLOGY

The Study Area, Ifo town which is the headquarters of Ifo Local Government Area of Ogun state, Nigeria (see figure1). The town is located on Latitude 6^o49 north and Longitude $3°12$ east. It has an area of 521 km^2 and a population of 524,837 which makes it the highest populated Local Government Area in Ogun State and accounts for one-quarter of the population of the state.   The   sample   frame consists of people in various households, businesses and social gatherings in the town. An incidental-random sampling technique was used. Data were collected with the aid of structured questionnaire administered on 520 respondents who are residents in the study area out of which 500 copies were returned andfound analyzable.

The simple Pearson Product Moment Correlation was employed to process the data generated. The simple bivariate correlation was used to examine interrelationships among the variables on one hand and the relationship between each of socio-economic variables and trips generated on the other hand. The contribution of each of the socioeconomic variables to the trips generated was established.
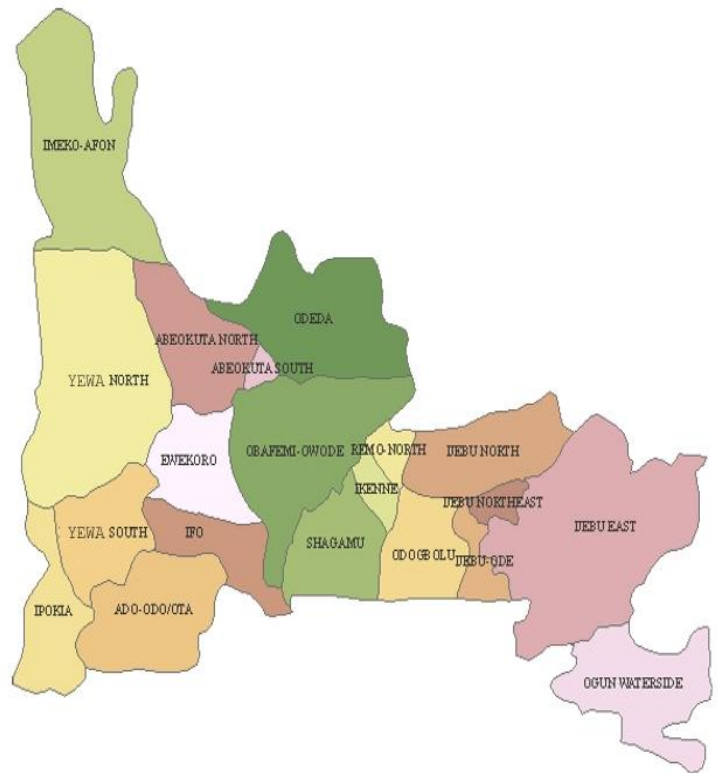

Figure 1: Map of Ogun State showing Local Government Areas.
Source: Ogun State Ministry of Lands and Housing (2010)

IV. RESULTS AND DISCUSSION

The specific socio-economic characteristics of respondents considered are education, income level and purpose of respondents' frequent trips. The elicited responses are presented in tables.

Table 1: Level of Education of Respondents

Level of education	Frequency	Percentage (%)
No formal education	100	20
Primary education	175	35
Secondary education	200	40
Tertiary education	25	5
Total	500	100

Source: Field survey 2015

Table 1 shows that, 40% of the respondents have secondary education, 35% have only primary education. Those who had no formal education account for 25% of the population while respondents who attended tertiary institutions are 5% of the sampled population.

Table 2: Income Level of Respondents

Income level per month	Frequency	Percentage (%)
Below ₦50,000	155	31
₦51,000- ₦100,000	165	33
₦ 101,000- ₦150,000	80	16
₦ 151,000- ₦200,000	60	12
₦200,000 and above	40	8
Total	500	100

Source: field survey 2015

Table 4.2 shows that, out of the 500 respondents, 31% earn less than ₦50,000per month and 33%earn between ₦51,000-₦100,000. Those who earn between ₦101,000-₦150,000 account for 16% of the sampled respondents, 12% of the population earn between ₦151,000- ₦200,000 and 8% earn₦200,000 and above.

Table 3: Purpose of Journey

Purpose	Frequency	Percentage (%)
Educational	95	19
Work	215	43
Commercial	165	33
Social meetings	15	3
Visit	10	2
Total	500	100

Source: field survey 2015

Table 3shows, largest percentage (43%) of the respondents chose their work as the major purpose of their frequent journeys. Those whose purposes of journey were educational and commercial are 19% and 33% respectively. 3% of the respondents chose social meetings while only 2% chose visitation.

Table 4: Trip generating zones that generate trips most.

		Frequency	Percent
Valid	Educational and commercial	145	29.0
	Residential	245	49.0
	Public and commercial	110	22.0
	Total	500	100.0

Source: field survey 2015

Table 4 shows that in the study area 50% of the sampled population's trip are generated from residential places, 30% of the respondents trips are generated from educational and commercial places and 20% of the trips are generated from public and commercial places.

Test of Hypothesis

The stated hypothesis was proved with each of the specifically identified socio-economic factors (Income, Education and Purpose of journey) treated individually as independent variables in three different correlations tests while trip generation plays the dependent variable in all the tests.

The three correlation tests carried out have probability value of 0.000 is below the conventional threshold of p<0.01 in a two-tailed test. Hence the correlation tests are statistically significant.

Correlation test 1 presents that there is a positive correlation co-efficient of 0.930 which shows that there is a direct relationship between the variables. In other words, there is a relationship income of respondents and trip generated from the zones. More so, the correlation co-efficient is very high hence a very high relationship between the variables is observed.

A positive correlation co-efficient of 0.818 in the test 2 shows that there is a direct relationship between the variables. In other words, there is a relationship educational level and trip generated from the zones. In other, people go to different places depending on their resourcefulness at the trip destination. More so, the correlation co-efficient is very high hence a very high relationship is also observed.

A positive correlation co-efficient of 0.775 in the third test also shows that there is a direct relationship between the variables. In other words, there is a direct relationship between the purpose of journey and trip generated from the zones and like in the previous tests, the correlation co-efficient is high hence a very high relationship is observed.

It should however be noted that the correlations tests for the three tables are statistically significant. The correlations co-efficient follow a descending order of 0.930, 0.818 and 0.775. The three values fall on the high side of the correlation measurement which means the three trip generation factors have high relationships with inter-city transportation. Since the probability value of each of the tests 0.000 is below the conventional threshold of p<0.01. The null hypothesis is rejected an the alternative hypothesis which states that *"there is a significant relationship between socio-economic characteristics of respondents and inter-city trip generated"* is accepted. This finding supports the work of Osoba (2011) and Raji (2013) in Lagos, Nigeria and further corroborated by the findings of Solanke (2015) in Abeokuta, where it was clearly stated that, the existing knowledge on socio-economic characteristics of residents and intercity trip generation in the developed nation and major cities in Nigeria is applicable in Ifo, Ogun state. It must however, be emphasized that the significant socio-economic variables may not be the same in major and emerging urban centres. For instance, number of workers, age and rent play dominant roles in this study, whereas the previous studies in major cities revealed greater influence of income among others.

V. CONCLUSION AND RECOMMENDATION

This paper has been able to evaluate influence of socio-economic characteristics of urban residents in intra-urban trip generation with a focus on Ifo Local Government Area of Ogun state, Nigeria.

It has been established in major urban centers, trip generation in Nigeria to a considerable extent a function of socioeconomic characteristics of the residents. It is however important to note that although socio-economic characteristics influence trip generation in both major and

emerging cities of the country, the significant variables may not be the same in the two categories of urban center.

It is therefore recommended that the existing transport planning laws and regulations should be reviewed to enhance proper integration of land use and transport. The laws should include all the land use and transport consideration for approval purposes. Planning laws should be enforced strictly and stringent penalty should be attached such that no one flouts the regulations and go unpunished.

REFERENCES

[1] Adeniji, K. (1991). Urban Mobility Crisis, where do we go from here? Paper delivered at Ogun State Public Service Forum Gateway Hotel, Abeokuta

[2] Adeniji, K. (2000). Transport challenges in Nigeria in the next to a declares. Transport studies Unit NISER Ibadan.p. 24.

[3] Adeniji, K. (1987), Public transportation and basic needs satisfaction in Nigeria, Research for develop-ment 4 (1&2): 292–304.

[4] Agunloye, O.O. (2013). Mobile Phone Usage and Travel Behaviour of Airline Passengers in Lagos, Nigeria Journal of Engineering and Environmental Studies,4(1), 33-40.

[5] Axhausen, K.W. and Garling, T.(1992). Activity Based Approach to Travel Analysis. Conceptual Framework, Models and Research Problem Transport Reviews12(4): 323-341

[6] Ayeni, B. (1979), Concepts and Techniques in urban analysis, Croom Helm Ltd, London.

[7] Bhat, C.B. and Koppelman, F.S.(1999). A retrospective and prospective survey of time use research. Transp.,26:119-139.

[8] Clark, D. (1973). Communication and the Urban Future.A case study of Trunk Telephone call patterns in Wales" Reg. Stud.,7(3):315-321.

[9] Fadare, S.O. (2010). Urban form and households' travel behaviour: Implications for Nigeria.

[10] An Inaugural Lecture. Series 230. Obafemi Awolowo University, Ile-Ife.

[11] Fadare, S.O., 1989. Analysis of Factors Affecting Household Trip Generation in the Residential Areas of Ibadan. Ife Res. Publ. Geography., 3:34-48

[12] Filani, M.O.(1991). Mobility Crisis in Nigeria Federal Government's Mass Transit Programme. Annals of the Social Science Council of Nigeria3:13-30.

[13] Filani, M.O. (1993). Transport and Rural Development in Nigeria. J.Trans.Geogr.,1(4):248-254

[14] Goddard, J.B. (1970). Functional Regions within the City Centre: A study of factor analysis of Taxi flows in Central London. Inst.Br. Geogr.Trans., 49:161-182

[15] Hanson, S. and Schwab, M. (1995), Describingdisag-gregate flows: individual and household activity patterns' in Hanson, S (ed) The geography of urban transportation, 2nd ed., The Guilford Press, New York.

[16] Mitchell, Robert B., and Chester Rapkin, 1954, Urban Traffic: a Function of Land Use, Columbia University Press, New York.

[17] Ojo, O.E (1990), Urban travels-activity patterns: A case study of Ibadan, Nigeria, Unpublished PhD Thesis, University of Ibadan

[18] Osoba, S.B. (2011) "Variation in the Ownership of Global System for Mobile Communication (GSM) among socio-economic groups in Lagos, Nigeria" *Journal of Logistics and Transport*,3(1): 79-94

[19] Oyesiku, O.O. (1990), Inter-urban travels pattern in Ni-geria: A case study of Ogun state, Unpublished PhD Thesis, University of Benin.

[20] Oyesiku, O.O. (2010), New cities in urban and regional development planning, Longman, Ikeja.

[21] Raji, B.A. (2013). Spatial analysis of pedestrian traffic in Ikeja, Lagos state Nigeria, Unpublished Ph.D Thesis, University of Ibadan.

[22] Solanke, M.O. (2013). Socio-economic characteristics of urban residents and intra-urban Trip generation: an illustration from abeokuta, ogun state, Nigeria'. Ethiopian Journal of Environmental Studies & Management 8(5): 593 – 605, 2015

[23] Srinivasan, S., 2005. Influence of Residential Location in Travel Behaviour of Women in Chennai, India. Division of Engineering and Applied Sciences, Harvard University

[24] Zegras, C. (1997) "Urban Transportation" in World Resources: The Urban Environment Habitat.

APPENDIX

Test 1: Correlation Test

		Trip generating zones	Income of respondents
Trip generating zones	Pearson Correlation	1	.930**
	Sig. (2-tailed)		.000
	N	500	100
Income of respondents	Pearson Correlation	.930**	1
	Sig. (2-tailed)	.000	
	N	500	100

**. Correlation is significant at the 0.01 level (2-tailed).

Test 2: Correlations Test

		Trip generating zones	Level of education
Trip generating zones	Pearson Correlation	1	.818**
	Sig. (2-tailed)		.000
	N	100	100
Level of education	Pearson Correlation	.818**	1
	Sig. (2-tailed)	.000	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

Test 3: Correlation Test

		Trip generating zones	Purpose of Journey
Trip generating zones	Pearson Correlation	1	.775**
	Sig. (2-tailed)		.000
	N	100	100
Purpose of Journey	Pearson Correlation	.775**	1
	Sig. (2-tailed)	.000	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).