

## Land Use Mix and Intra-Urban Travel Pattern in Ogbomoso, a Nigerian Medium Sized Town

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**ABSTRACT** Land use mix is a recognized factor of human travel behaviour in cities. It also relates to urban transport planning and management. It fact, it is often hypothesized that it can, within the context of current policy interest, reduce travel in cities and conserve energy and environmental impact relating to urban transport. This paper examines the relationship between land use mix and distribution of intra-urban trips among the town tracts of Ogbomoso. It was found that tracts with high land use mix generate and attract relatively large number of trips while tracts with low land use mix generate and attract relatively small number of trips. Similarly, tracts with high land use mix have high intra-zonal and inter-zonal trips and the tracts with low land use mix have relatively small intra-zonal and inter-zonal trips. The result is strange and different from empirical expectations and experiences of towns in developed countries. This may be due to the small size of the town in this study, the socio-economic and cultural background of the society or other variable of transport development. It calls for greater efforts in identifying more factors that influence urban transport and policy to solve urban transport problems, particularly in developing countries.

### 1. INTRODUCTION

Land use mix is one of the land use factors that affect intra-urban travel (TDME, 2004). It affects the intra-urban travel behaviour specifically, and it can have a profound influence on urban transport planning and management in general. Land use mix is the term used to describe the mixture of land uses in the same urban tract. This is in contradiction to the tradition and practice of the urban physical planning in which attempts are made to separate different land uses in different locations.

In developed countries whose cities are modeled in planning principles, land use mix is not common. However, cities of developing countries don't usually have the background of planning. This is particularly the case in countries that experienced colonization. Cities in them are of different types in respect of planning experience. There are those that predate colonization and the western type planning application. Others are the colonial and post colonial cities with physical planning touch. Land use mix pattern evolves as the unplanned cities grow. In those with planning experience, rapid and uncontrolled growth leads to admixture and non-separation of land uses. In all of them, mixture of the land use, in varying

degrees, and in different city tracts is the feature.

This carries implication for the economy and different activities in such cities. Travel behaviour of the urban residents is one of such that the land use mix affects. The possible influence of land use mix on the reduction of intra-urban travel, auto-dependence of cities, intra-city gasoline consumption and the city per capita environmental impact of automobile has been raised by different researchers (World Bank UTSR, 2002). It is often hypothesized that land use mix can reduce per capita vehicle travel. It is also believed that it reduces distance residents travel for services. In this case, it is supposed to encourage walking and cycling. To Modarres (1993), employees who work in a mixed use commercial area are significantly more likely to commute by alternative modes.

In literature, there has also been a debate as to the influence land use mix has on city vehicle travels particularly on how much job/housing balance in an area can reduce vehicle travel. Proponents of the idea, for example, Schwager (1995), argue that commute distances can be reduced if communities contain mix of residences and employment rather than being oriented toward a single land use. However critics argue that most urban residents do not consider closeness to workplace or to urban

services for their residential locations. This is particularly so if there are multiple workers and multi-variety of jobs in the households.

In the research by Cambridge Systems (1994), it is reported that the land use mix, accessibility to services and preponderance of convenient services have a reduction influence of about 0.9% to 5.7% on the use of private car (drive alone) in intra-urban travels. Another study (Davidson, 1994) found that presence of such service as banking, on-site child care, restaurant, gymnasium and postal services near residences or worksites can reduce weekday car travel by 14% and also lead to a reduction in trips and increased ridesharing.

It could be argued further however that such services referred to are not prominent in traditional Nigerian cities and not available to the residents of such cities. On the other hand, what is regarded as share-riding may be the use of taxi-cabs, buses or even other Para-transit vehicles, which are in use in most Nigerian cities.

If land use mix is to have such impact on vehicle travel, distance and others, what impact is it likely to have on urban residents travel behaviour? The main thrust of this study is to examine the relationship between land use mix and intra-urban travel pattern in a Nigerian medium sized city.

## 2. OGBOMOSO, THE STUDY SETTING

Ogbomoso is one of the medium sized cities in Nigeria. A town in the highly urbanised South-Western Nigeria which existed before colonial influence in the country but was not much favoured by colonial development forces (Maboguje, 1984). However, it is recovering from stagnation of colonial times by the independence political influence and in particular the siting in it of a University which is a footloose but high order developmental impetus. The population is of medium size by Nigerian standard, a little below a quarter of a million. The physical size is about 66.04 square kilometers in its physical extent but with the built up area of 28. square kilometres. Characteristic of cities in developing countries, its existence predated planning efforts in the country. As such, there is no land use segregation. The town has different parts with admixture of land uses. However, clearly evident in the town are two parts - the old parts inhabited by indigenes, traditional structures and mostly low socio-economic classes. The second part is

represented by cells of new layouts at the outskirts of the core area which are pronounced along main routes, giving the town somewhat elongated shape as a linear settlement. The main route in the town is the North- South Lagos-Kano routes which link the town with Oyo and Ilorin, equally medium sized cities, in the north and south respectively. The main socio-and economic activities in the town have shifted from the theoretical central area to the sites along the major routes almost obliterating the characteristic central business district of the urban structure in classical theories. All the same, the variation of city zones by distance from the centre is still evident in traditional area and the intermediate area as observed in the development of past fifty years.

## 3. METHODOLOGY

For this study, we required information about the appropriate tracts of the town, the components and the pattern of land use. and pattern of intra urban human travel in the town were required.

### 3.1 Pattern of Land Use in the Twenty Wards of Ogbomoso Town

In a traditional, unplanned town, land use zones are difficult to identify and delimit urban tracts that are easy to identify are political wards. The use of wards can be justified as acceptable jurisdiction in which information gathering and developmental decisions are convened and implementable.

In each of the 20 wards identified in the town, land use types, population figures, socio-economic characteristics of people and pattern of human travels are obtained. 10 of the 20 wards numbered 1 to 10 belong to Ogbomoso North Local Government, while the remaining 10 numbered 11 to 20 are for Ogbomoso South Local Government.

The land use components obtained for each ward through survey are shown in Table 1. The pattern shows a mix of land uses in each ward. The components are presented in percentages such that the total land use per ward is summed to one hundred percent. The land use in each ward is dominated by residential type, but a few other land use types feature fairly prominently in a few wards.

**Table 1: Land use characterization of the wards in Ogbomoso.**

| S. No. | Ward Name              | Residential | Commercial | Industrial | Recreation | Education | Other Public | Agric/vacant | Transport | Total |
|--------|------------------------|-------------|------------|------------|------------|-----------|--------------|--------------|-----------|-------|
| 1.     | Abogunde               | 66.5        | 4          | 2.5        | 2          | 4         | 1            | 5            | 15        | 100   |
| 2.     | Aaje/Ogunbado          | 75.5        | 4          | 1.5        | 2          | 0.5       | 1.5          | -            | 15        | 100   |
| 3.     | Masifa/Aguodo          | 37          | 5          | 2          | 10         | 23        | 5            | 5            | 13        | 100   |
| 4.     | Isale Afon             | 72          | 4          | 1.5        | 2          | 1.5       | 2.5          | 1.5          | 15        | 100   |
| 5.     | Isale Alasa            | 72.5        | 3          | 1          | 1.5        | 2         | 1            | 5            | 14        | 100   |
| 6.     | Saja/Isaleora          | 61.5        | 8          | 1.5        | 2          | 4         | 3            | 5            | 15        | 100   |
| 7.     | Jagun                  | 79.5        | 4          | 1          | 1          | -         | 4            | 0.5          | 10        | 100   |
| 8.     | Okelerin               | 67.5        | 10         | 0.5        | 1.5        | 1         | 4.5          | -            | 15        | 100   |
| 9.     | Osupa                  | 38          | 16         | 3          | 3          | 9         | 6            | 7            | 18        | 100   |
| 10.    | Sabo/Tara              | 39          | 17         | 7          | 5          | 4         | 3            | 6            | 19        | 100   |
| 11.    | Akata                  | 80          | 2          | 1          | 1          | 1.5       | 0.5          | 0.5          | 14        | 100   |
| 12.    | Alapata                | 71          | 1          | 0.5        | 1.5        | 3.5       | 0.5          | 1.2          | 11        | 100   |
| 13.    | Arowomole              | 65.5        | 6          | 2          | 1          | 7         | 2.5          | 8            | 8         | 100   |
| 14.    | Ibapon                 | 46.5        | 5          | 3.5        | 1          | 9         | 7            | 14           | 14        | 100   |
| 15.    | Ijeru I                | 81          | 3          | 0.5        | 0.5        | -         | 2            | -            | 13        | 100   |
| 16.    | Ijeru II               | 82.5        | 1.5        | 1          | 1          | -         | 1            | -            | 13        | 100   |
| 17.    | Ilogbo                 | 84          | 3.3        | 0.5        | 0.2        | -         | 1            | 6            | 5         | 100   |
| 18.    | Isoko                  | 89          | 2          | 1          | 1          | -         | 1            | 1            | 5         | 100   |
| 19.    | Lagbedu                | 73          | 5          | 0.5        | 1.5        | 1         | 1            | 10           | 8         | 100   |
| 20.    | Okeola/farm Settlement | 57.5        | 3          | 3          |            | 1         | 1.5          | 25           | 8         | 100   |

Source: Author's Fieldwork, 2004.

### 3.2 Data on Human Travels in Ogbomoso

By means of a questionnaire administered at different times of the day and different days of the week in a six week survey, the information on human travel was obtained for Ogbomoso. The questionnaire has a section on the socio-economic characteristics of the trips makers, and another section on the information about the origin, destinations, purposes, and means of transport used, etc. in respect of the current urban travel made.

Almost equal number of questionnaires were administered in each ward ranging between 18 and 22. In all, an average of twenty questionnaires per ward were collected totaling 400. In a few questionnaires, some pieces of information were missing due to non-response. The respondents who are observed to be on intra-urban trip or were potential intra-urban travellers were randomly selected and interviewed, en route, like the popular Chicago study. The exercise was carried out in July and August, 2004. The information obtained provides the data analysed below.

#### 4. ANALYSIS: CATEGORIZING URBAN TRACTS BY LEVEL OF LAND USE MIX

Table 2 indicates the land use pattern in

**Table 2: Categories of land use mix in Ogbomoso**

| Ward No.          | Ward name      | Percentage of residential land use | Percentage of other uses | Total percentage |
|-------------------|----------------|------------------------------------|--------------------------|------------------|
| <i>Category A</i> |                |                                    |                          |                  |
| 3.                | Masifa/Aguodo  | 37                                 | 63                       | 100              |
| 9.                | Osupa          | 38                                 | 62                       | 100              |
| 10.               | Sabo/Taraa     | 39                                 | 61                       | 100              |
| 14.               | Ibapon         | 46.5                               | 53.5                     | 100              |
| <i>Category B</i> |                |                                    |                          |                  |
| 1.                | Abogunde       | 66.5                               | 33.5                     | 100              |
| 4.                | Isale Afon     | 72                                 | 28                       | 100              |
| 5.                | Isale Alasa    | 72.5                               | 27.5                     | 100              |
| 6.                | Saja/Isale ora | 61.5                               | 38.5                     | 100              |
| 8.                | Okelerin       | 67.5                               | 32.5                     | 100              |
|                   | Alapata        | 71                                 | 29                       | 100              |
| 12.               | Arowomole      | 65.5                               | 34.5                     | 100              |
| 13.               | Lagbedu        | 73                                 | 27                       | 100              |
| 19.               | Oke-ola/Farm   |                                    |                          |                  |
| 20.               | Settlement     | 57.5                               | 42.5                     | 100              |
| <i>Category C</i> |                |                                    |                          |                  |
| 2.                | Aaje/Ogunbado  | 75.5                               | 24.5                     | 100              |
| 7.                | Jagun          | 79.5                               | 20.5                     | 100              |
| 11.               | Akata          | 80                                 | 20                       | 100              |
| 15.               | Ijeru I        | 81                                 | 19                       | 100              |
| 16.               | Ijeru II       | 82.5                               | 17.5                     | 100              |
| 17.               | Ilogbo         | 84                                 | 16                       | 100              |
| 18.               | Isoko          | 89                                 | 11                       | 100              |

Ogbomoso. The domination of the town by residential land use is the order evident as shown in column 3 of Table 1. There is no tract with less than 37% residential land use. The other land uses in the town are indicated in the next column.

**Table 3: Distribution of land uses and intra-urban trips in Ogbomoso**

| S.No. | Name                   | Residential | Other uses | Trips generated | Trips attracted | Intrazonal trips | Interzonal trips |
|-------|------------------------|-------------|------------|-----------------|-----------------|------------------|------------------|
| 1.    | Abogunde               | 66.5        | 33.5       | 4               | 3               | 1                | 2                |
| 2.    | Aaje/Ogunbado          | 75.5        | 24.5       | 8               | 16              | 7                | 4                |
| 3.    | Masifa/Aguodo          | 37          | 63         | 41              | 65              | 24               | 16               |
| 4.    | Isale Afon             | 72          | 28         | 12              | 17              | 2                | 3                |
| 5.    | Isale Alasa            | 72.5        | 27.5       | 11              | 13              | 3                | 2                |
| 6.    | Saja/Isaleora          | 61.5        | 38.5       | 30              | 27              | 17               | 6                |
| 7.    | Jagun                  | 79.5        | 20.5       | 7               | 2               | 4                | 1                |
| 8.    | Okelerin               | 67.5        | 32.5       | 31              | 34              | 14               | 15               |
| 9.    | Osupa                  | 38          | 62         | 42              | 31              | 25               | 7                |
| 10.   | Sabo/Tara              | 39          | 61         | 72              | 84              | 39               | 25               |
| 11.   | Akata                  | 80          | 20         | 2               | 1               | -                | -                |
| 12.   | Alapata                | 71          | 29         | 10              | 5               | 14               | 3                |
| 13.   | Arowomole              | 65.5        | 35.5       | 30              | 16              | 15               | 1                |
| 14.   | Ibapon                 | 46.5        | 53.5       | 6               | 7               | 4                | 3                |
| 15.   | Ijeru I                | 81          | 19         | 5               | 3               | 1                | -                |
| 16.   | Ijeru II               | 82.5        | 17.5       | 16              | 11              | 8                | 3                |
| 17.   | Ilogbo                 | 84          | 16         | 5               | 3               | 1                | 1                |
| 18.   | Isoko                  | 89          | 11         | 6               | 1               | 5                | 1                |
| 19.   | Lagbedu                | 73          | 27         | 14              | 22              | 9                | 7                |
| 20.   | Okeola/farm Settlement | 57.5        | 52.5       | 41              | 38              | 28               | 10               |

The degree of mixture can be inferred from the percentage of residential land uses observable in each urban tract. In other words, the percentage of residential land uses or the reverse can represent the measure of land use mix in each tract. This is what is used as input in the analysis as land use mix indicator.

In terms of land use mix, three categories of the town tracts can be recognized as shown in Table 4. These are.

- (1) Tracts with low residential content and high land use mix. These are the tracts with 37-50% residential land uses and the remaining percentage devoted to other uses.
- (2) The second class of tracts are those with 50-75% residential land use these can be regarded as of medium land use mix.
- (3) The third category is the group of tracts whose percentage of residential land use is above 75. In these, the other uses exist but are small.

#### 4.1 Distribution of Land Uses and Intra Urban Trips in Ogbomoso

Table 3 shows the distribution of intra-urban trips in Ogbomoso as obtained from the field work with respect to trip generation volume, trip attraction volume, and volume of intra-zonal and inter-zonal trips of the each tract of the town. The trips generated, trips attracted, and the trips that circulate within and between tracts vary among the tracts.

#### 4.2 Analysis Of Intra-Urban Travel Pattern by Land Use Mix Categories

##### 4.2.1 Land Use Mix Categories and Trip

**Generation:** Table 4 shows the number of trips generated by different categories of urban tract by land use mix structure. Means and standard deviations of the three categories are shown. It is shown that high land use mix generates large number of trips. Tracts with high land use mix generate relatively small number of trips. The number of trips reduce with increasing mix of land use. The differences between the means are significant with chi square test at 0.01 level.

The range of the means is from 40.25 to 7.00. The tracts in which the mix with residences is between 37% to 50% generates the mean trip volume of 40.25, the tracts with the percentage mix of 50-75% generates the mean trip volume of 20.33, while the tracts with the percentage mix of above 75% generates the mean trip volume of 4.79. The table also shows the means of the variables as different by the three categories of the land uses. The difference among the means as tested by chi square is significant at 0.01

##### 4.2.2 Land Use Mix and Trip Attraction:

In Table 6, the trips attracted by different tracts of the town are indicated. The same trend as for the trip generation is observed. The mean trips attracted by the high, medium and low land use mix are 46.75, 19.44 and 5.29 mean trips

**Table 4: Land use mix and trip generation**

| Ward No.        | Ward Name                   | Percentage of residential land use | Percentage of others uses | Trip generated | * Mean | Std Dev |
|-----------------|-----------------------------|------------------------------------|---------------------------|----------------|--------|---------|
| (>50%)<br>Mix   | 3. Masifa/Aguodo            | 37                                 | 63                        | 41             | 40.25  |         |
|                 | 9. Osupa                    | 38                                 | 62                        | 42             |        |         |
|                 | 10. Sabo/TaraaI             | 39                                 | 61                        | 72             |        |         |
|                 | 14. bapon                   | 46.5                               | 53.5                      | 6              |        |         |
| (25-50%)<br>Mix | 1. Abogunde                 | 66.5                               | 33.5                      | 4              | 20.33  |         |
|                 | 4. Isale Afon               | 72                                 | 28                        | 12             |        |         |
|                 | 5. Isale Alasa              | 72.5                               | 27.5                      | 11             |        |         |
|                 | 6. Saja/Isale ora           | 61.5                               | 38.5                      | 30             |        |         |
|                 | 8. Okelerin                 | 67.5                               | 32.5                      | 31             |        |         |
|                 | 12. Alapata                 | 71                                 | 29                        | 10             |        |         |
|                 | 13. Arowomole               | 65.5                               | 34.5                      | 30             |        |         |
|                 | 19. Lagbedu                 | 73                                 | 27                        | 14             |        |         |
|                 | 20. Oke-ola/Farm Settlement | 57.5                               | 42.5                      | 41             |        |         |
| (<25%)<br>Mix   | 2. Aaje/Ogunbado            | 75.5                               | 24.5                      | 8              | 7.00   |         |
|                 | 7. Jagun                    | 79.5                               | 20.5                      | 7              |        |         |
|                 | 11. Akata                   | 80                                 | 20                        | 2              |        |         |
|                 | 15. Ijeru I                 | 81                                 | 19                        | 5              |        |         |
|                 | 16. Ijeru II                | 82.5                               | 17.5                      | 16             |        |         |
|                 | 17. Ilogbo                  | 84                                 | 16                        | 5              |        |         |
|                 | 18. Isoko                   | 89                                 | 11                        | 6              |        |         |

\* $\chi^2 = 24.87$  Significant at 0.01

**Table 5: Land use mix and trip attraction**

| Ward No.        | Ward Name                   | Percentage of residential land use | Percentage of others uses | Trip attracted | * Mean | Std Dev |
|-----------------|-----------------------------|------------------------------------|---------------------------|----------------|--------|---------|
| (>50%)<br>Mix   | 3. Masifa/Aguodo            | 37                                 | 63                        | 65.00          | 46.75  |         |
|                 | 9. Osupa                    | 38                                 | 62                        | 31.00          |        |         |
|                 | 10. Sabo/Taraa              | 39                                 | 61                        | 84.00          |        |         |
|                 | 14. Ibapon                  | 46.5                               | 53.5                      | 7.00           |        |         |
| (25-50%)<br>Mix | 1. Abogunde                 | 66.5                               | 33.5                      | 3.00           | 19.44  |         |
|                 | 4. Isale Afon               | 72                                 | 28                        | 17.00          |        |         |
|                 | 5. Isale Alasa              | 72.5                               | 27.5                      | 13.00          |        |         |
|                 | 6. Saja/Isale ora           | 61.5                               | 38.5                      | 27.00          |        |         |
|                 | 8. Okelerin                 | 67.5                               | 32.5                      | 34.00          |        |         |
|                 | 12. Alapata                 | 71                                 | 29                        | 5.00           |        |         |
|                 | 13. Arowomole               | 65.5                               | 34.5                      | 16.00          |        |         |
|                 | 19. Lagbedu                 | 73                                 | 27                        | 22.00          |        |         |
|                 | 20. Oke-ola/Farm Settlement | 42.5                               | 42.5                      | 38.00          |        |         |
| (<25%)<br>Mix   | 2. Aaje/Ogunbado            | 75.5                               | 24.5                      | 16.00          | 5.26   |         |
|                 | 7. Jagun                    | 79.5                               | 20.5                      | 2.00           |        |         |
|                 | 11. Akata                   | 80                                 | 20                        | 1.00           |        |         |
|                 | 15. Ijeru I                 | 81                                 | 19                        | 3.00           |        |         |
|                 | 16. Ijeru II                | 82.5                               | 17.5                      | 11.00          |        |         |
|                 | 17. Ilogbo                  | 84                                 | 16                        | 3.00           |        |         |
|                 | 18. Isoko                   | 89                                 | 11                        | 1.00           |        |         |

\* $\chi^2 = 37.29$  Significant at 0.01

respectively. This means the tract with high land use mix attract relatively large number of trips while the tracts with low land use mix attract relatively small number of trips. From the results of the analyses, trip generation and trip attraction reduce with decreasing land use mix.

#### 4.3 Intra and Inter-Zonal Travel Pattern Analysed by the Land Use Mix Categories

Table 6 carries the figures of the intra- zonal and inter-zonal trips in each tract as observed in the three categories of land use mix. Ayeni (1979)

**Table 6: Land use mix and intra-zonal/inter-zonal trips**

| Ward No. | Ward name               | % Residential land use | % of other uses | Intrazonal trips | *Mean | StdDev | Interzonal Trips | **Mean | StdDev |
|----------|-------------------------|------------------------|-----------------|------------------|-------|--------|------------------|--------|--------|
| 3.       | Masifa/Aguodo           | 37                     | 63              | 24.00            | 23.00 |        | 16.00            | 12.75  |        |
| 9.       | Osupa                   | 38                     | 62              | 25.00            |       |        | 7.00             |        |        |
| 10.      | Sabo/Taraa              | 39                     | 61              | 39.00            |       |        | 25.00            |        |        |
| 14.      | Ibapon                  | 46.5                   | 53.5            | 4.00             |       |        | 3.00             |        |        |
| 1.       | Abogunde                | 66.5                   | 33.5            | 1.00             | 11.44 |        | 2.00             | 5.44   |        |
| 4.       | Isale Afon              | 72                     | 28              | 2.00             |       |        | 3.00             |        |        |
| 5.       | Isale Alasa             | 72.5                   | 27.5            | 3.00             |       |        | 2.00             |        |        |
| 6.       | Saja/Isale ora          | 61.5                   | 38.5            | 17.00            |       |        | 6.00             |        |        |
| 8.       | Okelerin                | 67.5                   | 32.5            | 14.00            |       |        | 15.00            |        |        |
| 12.      | Alapata                 | 71                     | 29              | 14.00            |       |        | 3.00             |        |        |
| 13.      | Arowomole               | 65.5                   | 34.5            | 15.00            |       |        | 1.00             |        |        |
| 19.      | Lagbedu                 | 73                     | 27              | 9.00             |       |        | 7.00             |        |        |
| 20.      | Oke-ola/Farm Settlement | 57.5                   | 42.5            | 28.00            | 3.70  |        | 10.00            | 1.43   |        |
| 2.       | Aaje/Ogunbado           | 75.5                   | 24.5            | 7.00             |       |        | 4.00             |        |        |
| 7.       | Jagun                   | 79.5                   | 20.5            | 4.00             |       |        | 1.00             |        |        |
| 11.      | Akata                   | 80                     | 20              | -                |       |        | -                |        |        |
| 15.      | Ijeru I                 | 81                     | 19              | 1.00             |       |        | -                |        |        |
| 16.      | Ijeru II                | 82.5                   | 17.5            | 8.00             |       |        | 3.00             |        |        |
| 17.      | Ilogbo                  | 84                     | 16              | 1.00             |       |        | 1.00             |        |        |
| 18.      | Isoko                   | 89                     | 11              | 5.00             |       |        | 1.00             |        |        |

\*  $\chi^2 = 14.84$  significant at 0.01

\*\*  $\chi^2 = 10.078$  significant at 0.01

describes the greatness of the intra-zonal trips than inter-zonal trips as evidencing heterogeneity of the land use of the urban tract concerned. This is the case in most of the tracts in this study as shown in the table. The mean figures of the trips and their standard deviations are shown in Table 6. The differences are significant at 0.01 levels as tested with chi square. It is observed that intra-zonal movement of people is high in urban tracts with high land use mix and it is low in the tracts with low land use mix. The same is true of inter-zonal trips. The inter-zonal trips also increase with the high land use mix and it reduces with low land use mix.

## 5. DISCUSSION OF FINDINGS AND IMPLICATIONS

The result obtained in this study is strange as against the general belief. In the study, travel volume increase with increasing land use mix. It is the general belief that travel volume would reduce with increasing land use mix. This is not the case in this study and land use pattern in the town is not likely to reduce auto-travel, travel distance, or encourage significantly the change of use of vehicle to choice of cycling or walking.

The explanation could lie in three extraneous

factors. One of them could be the cultural uniqueness of the developing economy which may underline the urban residents movement pattern as different from the cities of developed economy. Another point may relate to the kind and the distribution of the purposes or activities generating the movement of people in cities of developing countries that are unique. For instance the general intra-urban movement pattern which is driven by strong economic forces may be different from that driven mostly by social interest or a mixture of economic and social activities. For instance, in the purposes of intra-urban movement in most traditional cities, social visit is prominent. In this study, social visit as purpose of movement is prominent in Ogbomoso as shown in Table 7. The table shows the activities for which residents of Ogbomoso make intra-urban travels. Two activities dominate the trip making. These are work and social visit. The prominence of work accounting for 31.3% of the total trips is not surprising but that social visit account for 30.3% is revealing, pointing to the cultural influence on the intra-urban trip making in the town. In a developing African society, the culture of social visit is important where material economy has not fully replaced non-material activities.

The third factor which may be responsible for

**Table 7: Activities involved in intra-urban travels in Ogbomoso**

| Activities               | No. of trips | Percent |
|--------------------------|--------------|---------|
| Business                 | 22           | 5.5     |
| Purchase/ Shopping       | 46           | 11.5    |
| Work                     | 125          | 31.3    |
| Schooling/Education      | 34           | 8.5     |
| Personal                 | 15           | 3.8     |
| Social Visit             | 121          | 30.3    |
| Recreation               | 3            | 0.8     |
| Spiritual                | 7            | 1.8     |
| Residence /Home-oriented | 25           | 6.3     |
| Others                   | 1            | 0.3     |
| TOTAL                    | 400          | 100     |

Source: Author's Fieldwork, 2004

the unique result may be hypothesized in the distribution of transport land use among the urban tracts. This is shown in column 10 of Table 1, it could be observed that transport land- use and transport facilities are higher in the tracts with high land use mix and relatively low in the areas with low land use mix. Better transport facilities such as smooth and wide roads as well as large number of parking facilities may promote movement in the areas where they exist and by so doing has disruptive or a reversal influence on the conventional picture of movement reducing in high land use mix when compared to areas with low land use mix.

The correlations between transport land use variable on one hand and the trip generation and trip attraction of the urban tracts examined in this study on the other, are 0.340 and 0.416 respectively. The correlation figures are relatively low but are positive to suggest some relationship.

With the result obtained, it is suggested that results of studies in developed economy needs to be examined carefully for application to cities in developing economy. The factors behind the two situations usually differ.

Furthermore, researchers need to work further on factors behind the urban economy and urban transport. "No single, simple variable offers a complete explanation or solution to the transport-related problems of urban growth" (World Bank UTSR, 2002, p.22).

## 6. SUMMARY OF FINDINGS AND CONCLUSION

As is usual with the traditional towns in Nigeria, mixture is the main structure of land use arrangement in Ogbomoso as a medium sized Nigerian town. However, the degree of land use

mix varies from urban tract to urban tract. Residential land use dominates all the tracts such that there is no tract with less than 37% buildings used for residences. Other uses such as commercial, light industrial use, etc, exist in small but varying proportion in each of the tracts. On the basis of these, three categories of the urban tracts in terms of high, medium and low land use mix are recognized.

In the analysis, it is shown that the higher the land use mix, the greater the intra-urban movement within and between the tracts. Conversely, the lower the land use mix the smaller the human movement.

This may be due to the small area size of the town studied. The town is 66.04 sq kilometres in size which is relatively small compared with Lagos, Ibadan, Abuja in Nigeria or New York in US or any other capital cities of the world. The strange result may also be due to the nature of the society, the level of economy and possibly other variables such as transport development in different tracts. It may be due to other extraneous factors such as the preponderance of residence as a major land use in different parts of the city.

Whatever are the factors behind the pattern, the empirical finding is different from the hypothetical belief that increasing land use mix leads to reduction in intra-urban movement with a possibility that modal split, cycling or walking would eventually dominate the urban transport pattern. By implication, caution should be exercised in adopting land use mix as a policy instrument for transport planning in a medium-sized indigenous African town where mixture of land use evolves naturally unplanned.

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