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The Role of Intermediate Means of Transport in Rural Income Generation: A Nigerian Experience

By

¹ B. A. Usman and J. A. Ariyo²

¹Department of Geography and Environmental Management,
University of Ilorin, Ilorin.

²Department of Geography,
Ahmadu Bello University, Zaria.

Abstract

Intermediate Means of Transport (IMT) plays a very important role in satisfying travel needs in the rural areas of Africa, where motorable roads are grossly inadequate and the level of motorization is very low. This study examines the contributions of IMT to rural income generation in Kwara State, Nigeria. The study used data from 30 rural settlements spread across the three senatorial districts of the state, derived through questionnaire survey. The data was analyzed using stepwise multiple regression analysis after it was first subjected to factor analysis to reduce the variables to a few orthogonal variables. The results show that ownership of IMT contributes 58.5% to the variance and is the best predictor of factors determining opportunity for additional income in the area. Implying that better access to IMT improves the level of personal mobility thereby, raising opportunities for agricultural and off-farm income generation and enhances general wellbeing in rural areas of Kwara State. It was however further discovered that better transport facilities; closeness to major centres and being male also raises the opportunity for additional income in the area. It was therefore suggested that improving the condition of footpaths, track and footbridges along which most rural travels occur, adoption of improved forms of IMT with higher load carrying capacity and policy measures to reduce cost of vehicles would help to improve personal mobility and general wellbeing in rural areas of the country.

Introduction

Transportation plays an important role in the generation of economic growth and general wellbeing of people in both urban and rural areas. Thus, access to food, shelter, education and employment opportunities require adequate mobility (Owen, 1987). Although, there appears to be a race for motorization among countries of the world, many people especially in developing countries lack access to modern transport infrastructure and services. Lebo and Dieter (2001) observed that up to 900 million rural dwellers in developing countries have no access to reliable all season road while almost 300 million have no access to motorized transport. While commercial motor vehicles often provide the main link to the wider economy, for majority of rural dwellers in Africa local level travels are usually on foot or with the use of various forms of Intermediate Means of Transport (IMT) (Kasuku, 2002). These local level journeys are mostly along local footpaths and tracks far from any conventional road (Barwell, 1996).

In instances where there is road access rural dwellers still suffer greatly from high transport cost and poor transport services (Ellis and Hine, 1998). Thus, in rural Sub-Sahara Africa where over 90% of movements are local level travels pack animals, animal-drawn carts, hand carts, bicycles, and motorcycles continue to play an important role in the rural economy (Kasuku, 2002). In Nigeria, IMT remain very important for satisfying travel needs especially in the rural areas where motorable roads are grossly inadequate and the level of motorization is very low. Therefore, due to poor transport infrastructure and services, low level of economic activities and low income levels in Nigeria, IMT will continue to play the important role of bridging the mobility gap in rural areas.

Role of Intermediate Means of Transport (IMT) in the rural economy

Intermediate Means of Transport (IMT) are the means of transport intermediate between traditional mode of walking and the modern conventional motor vehicles like cars, trucks etc (Barwell, 1996). Compared to conventional vehicles IMT are characterized by lower investment cost, low transport capacity, less complexity of maintenance and simple infrastructural requirements. IMT used in different parts of Africa include wheelbarrow, hand-cart, animal-drawn carts, pack donkeys, bicycle, bicycle trailer and motorcycle (Ogunsanya and Galtima, 1993 and Barwell, 1996).

Ownership of IMT has been linked to improved mobility in developing countries. Though, the role of IMT is not appreciated by decision makers in Africa (Starkey, 2005), ownership of IMT is known to increase efficiency of personal travel and movement of goods. They reduce the time and effort required to assemble inputs and move produce to the market. They also facilitate small enterprise activities, facilitate access to basic facilities and improve access to off-farm employment (Barwell, 1996). Barwell further classified the agricultural role of IMT into four types. First, they shorten travel time to and from the farms. Second, they increase efficiency by reducing the number of trips required. Third, they reduce effort required to transport inputs to and produce from the farms. Fourth, IMT reduce the risk from pest damage and crop spillage because, crops can be evacuated at faster rate.

Using data from Burkina Faso, Cameroon, Zambia and Tanzania Starkey (2005) observed that, more rural dwellers depend on IMT than motorized transport. For instance, in the Mouhoum district of Burkina Faso there were about 22,000 IMT compared to the available fleet of 80 motor vehicles. Similarly, in the Luapula district of Zambia there were about 80,000 IMT compared to 180 motor vehicles in the area (Starkey, 2005). The agricultural economic benefits from the use of personal IMT are in form of savings in hire of labour and reduction of crop losses (Barwell, 1996).

In a study of rural Sumatra, Carvero (1992) reported that, households with IMT like motorcycles, bicycles and scooters have better access to agricultural and off-farm incomes. He noted that off-farm earnings constituted about 42 percent of total income in the area. Income from sales of farm produce constitutes 45 percent, while income from sales of livestock, subsidies and remittances from relatives form 13 percent. Similarly, using evidences from Uganda, Burkina Faso and Zambia, Barwell (1996) noted that, the use of IMT improves household income by allowing larger areas to be cultivated, increasing labour productivity and helping to reduce losses at harvest time. In their study of Amuro district of Kogi State, Ipingbemi and Aloba (2005) concluded that the use of IMT enhances mobility of rural dwellers. They further noted that male domination of the use of IMT like bicycles contribute to higher poverty level recorded among women. The objective of this study is to examine the contribution of IMT to rural income generation in Kwara State.

Materials and Methods of Study

Kwara State is located between latitudes $8^{\circ} 05'N$ to $10^{\circ} 05'N$ and longitudes $2^{\circ} 50'E$ to $6^{\circ} 05'E$. The State occupies a total area of about 32, 500 square kilometers with a population of 2,365,353 in 2006 (Federal Republic of Nigeria, Official gazette, 2009). The state is about 70 percent rural and 30 percent urban (Oyebanji, 2000).

The study used mainly primary data obtained through questionnaire survey. A total of 993 household heads in 30 rural settlements spread across the three senatorial districts of the state were sampled. The three Local Government Areas (LGAs) covered are: Kaiama (Kwara North), Ilorin East (Kwara Central) and Ekiti (Kwara South). Both Kaiama and Ekiti Local Government Areas could be said to be remote from Ilorin the state capital. Furthermore, Kaiama LGA is one of the two LGAs, which can not be reached from other parts of the state without passing through either Oyo or Niger states. Ekiti and Kaiama are also among the LGAs with sparse road density in the State (Aderamo, 2007). On the other hand, the choice of Ilorin East LGA is guided by the need to observe the effect of closeness to Ilorin city, the major urban centre in the state. Most importantly, the selection of the three LGAs is guided by the need to achieve a geographical spread. The selected LGAs are shown in Figure 1. The first 10 settlements with populations below 20, 0000 in each LGA were selected and used for the survey. Using the estimated average rural household size of 5 persons/household in Nigeria (NBS, 2006 and NPC, 2009), 5% of households in each of the settlements were sampled.

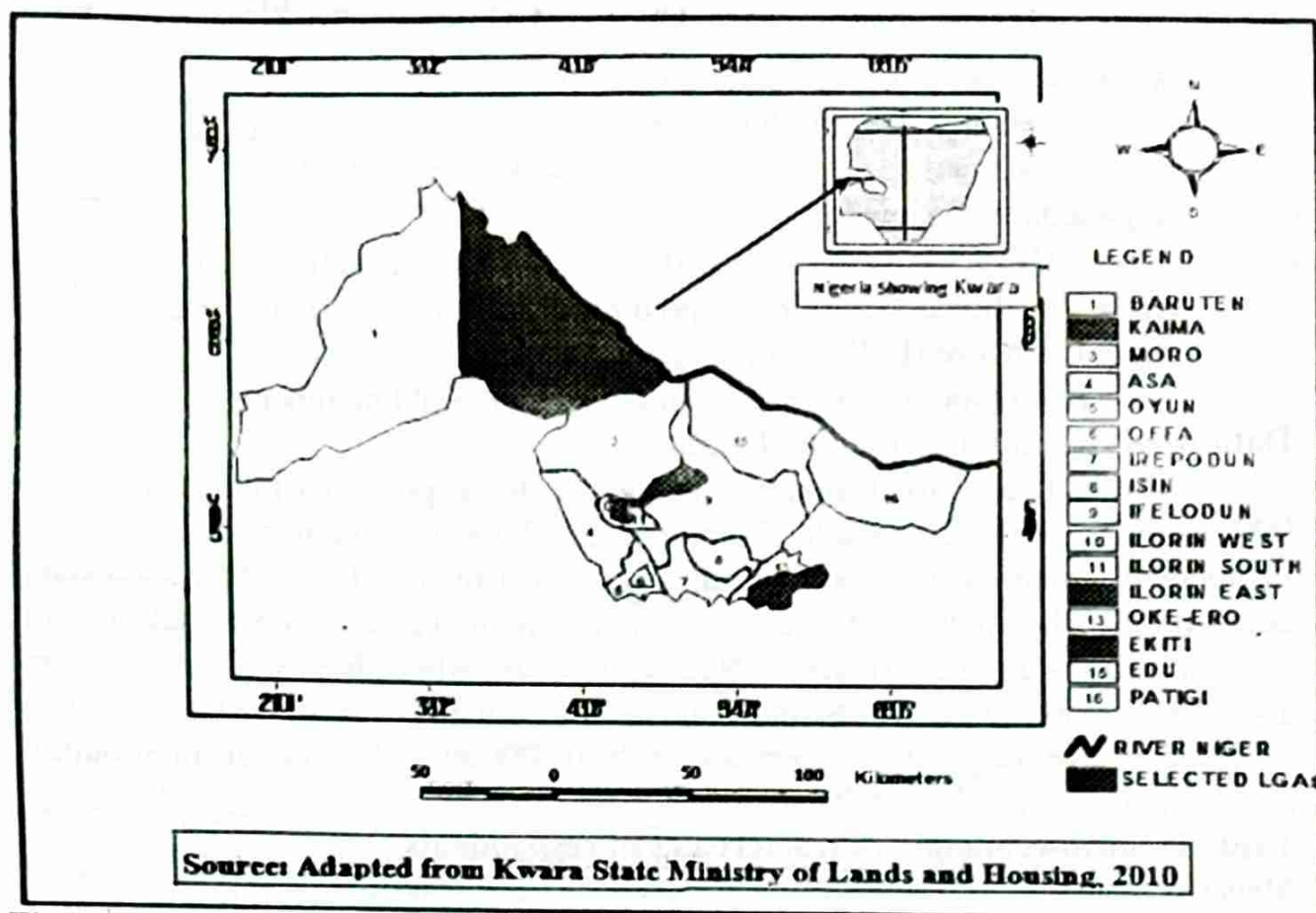


Fig1: Kwara State showing sampled Local Government Areas

The data collected were analyzed using multiple regression analysis. The data was however first subjected to factor analysis procedure to reduce them to a few orthogonal variables, later imputed into the regression model. The regression equation is in the form:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_{15}x_{15} + e \quad \text{where}$$

Y = Annual additional income (in Naira)

x_1 = Age of head of household (AGE) (in years)

x_2 = Distance to Major Road (DSMR) (In kilometers)

x_3 = Income from main occupation (ICMOC) (Amount in Naira).

x_4 = Motorcycle ownership (MCOW)

(Number of motorcycles in the household)

x_5 = Bicycle ownership (BCOW)

(Number of bicycles in the household)

x_6 = Distance to Major Market (DSMM) (In kilometers)

x_7 = Sex of household head (SEX) (female = 1, male = 2)

x_8 = Road Distance to LGA headquarter (RDLG) (In kilometers).

x_9 = Category of Road to settlement (RDCR) (Route Access Index 0 – 5).

x_{10} = Nature of Transport Service (NTSR).

- (No transport service = 0, all five vehicle types = 5)
 x_{11} = Regularity of Transport Service (RGTSR)
 (Mean score for all vehicle services considered/LGA. i.e.
 Ekiti = 11.26, Ilorin East = 12.24, Kajama = 9.39).
 x_{12} = Education level (EDL)
 (No formal education = 0..... Tertiary education = 3)
 x_{13} = Vocational skill of household head (VOC) (No = 0, Yes = 1).
 x_{14} = Farm size (FMSZ) (in hectares)
 x_{15} = Household size (HSZ) (Number of household members)

Data Analysis and Discussion of Results

The estimated total monthly income of the respondents ranges from N5,000 to N79,200 per month. This includes both the income derived from respondents' main occupation and other additional income from other secondary occupations. The analysis of total monthly income in Table 1 shows that 46% of the respondents do not earn above N15,000/month. Also, about 60% do not earn above N20,000/month. On the other only 6.2% earn above N50,000 while just 7 or 0.7% of the respondents earn above N70,000/month. The mean monthly income in the area is N18,676.

Table 1: Socio-economic characteristics of respondents

Main Occupation of Respondents	Frequency	%	Cumulative %
Farming	321	32.3	32.3
Fishing	6	0.6	32.9
Trading	148	14.9	47.8
Civil Servant	246	24.8	72.6
Craft/Tradesman	272	27.4	100
Total	993	100	
Total Income			
5,000 – 10,000	232	23.4	23.4
10,001 – 15,000	225	22.7	46.0
15,001 – 20,000	132	13.3	59.4
20,001 – 25,000	146	14.7	74.1
25,001 – 30,000	68	6.8	80.9
30,001 – 35,000	52	5.2	86.1
35,001 – 40,000	33	3.3	89.4
40,001 – 45,000	21	2.1	91.6
45,001 – 50,000	22	2.2	93.8
50,001 – 55,000	16	1.6	95.4
55,001 – 60,000	18	1.8	97.2
60,001 – 65,000	12	1.2	98.4
65,001 – 70,000	9	0.9	99.3
Over 70,000	7	0.7	100

Mean monthly income = N18,676

Source: Field survey, 2011

A total of 305 (30.7%) of the respondents indicated not earning any additional income apart from income from their main occupations (Table 2). While 59.1% do not earn above N5, 000, only 0.7% earn above N25, 000 per month as additional income. Although, only 32.3% of the respondents are full time farmers many of those in other occupations indicated engaging in farming or trading in agricultural produce to earn additional income.

Table2 : Additional income

Amount (Naira)	Frequency	%	Cumulative %
Nil	305	30.7	30.7
< 2, 000	90	9.1	39.8
2, 001 – 5, 000	192	19.3	59.1
5, 001 – 10, 000	286	28.8	87.9
10, 001 – 15, 000	99	10.0	97.9
15, 001 – 20, 000	11	1.1	99.0
20, 001 – 25, 000	3	0.3	99.3
Over 25, 000	7	0.7	100

Source: Field survey, 2011

For instance, it was observed that many of the teachers and other civil servants in the area use the opportunity of their rural posting to farm or trade to augment their monthly salaries. On the other hand, many farmers earn extra income as construction labourers, security guards etc in nearby urban centres especially during the dry season when farming activities are usually at low cbb. In addition some of the farmers, artisans and even civil servants who own motorcycles also use them to provide for-hire transport services. There are instances where the income from secondary occupation is even far above income from main occupation. Mean additional income is highest in Kaiama LGA (N5, 082) and lowest in Ekiti LGA where it is N4, 368 (Table 3).

Ownership of personal means of transport is important in the study area with 58.2% of the sampled households possessing at least one personal means of transport. IMT ownership rate is also highest in Kaiama LGA where 65% of the sampled households possess at least a motorcycle or bicycle. The vast agricultural land in Kaiama LGA provides an opportunity for farming and trading even among civil servants and others in other occupations. Also, many of the people confirmed that they derive extra income by using their personal motorcycles to provide for-hire transport services. Kaiama is exceptionally noted for its poor road transport infrastructure and services. For instance, Aderamo (2007) noted that as at 1999 all the 519 kilometers of roads in Kaiama LGA consisted of earth road. The situation today is not much different from this observation. Generally, many of the sampled settlements with high mean

additional income also have high IMT ownership rate. These include: Eruku and Obbo Ile (Ekiti); Oke Oyi and Iponrin (Ilorin East); Kalama and Aboki (Kalama LGA) (Table 3).

Table 3: Distribution of additional income and IMT ownership rate in the sampled LGAs

LGAs/Settlements	Additional Income			IMT ownership rate %
	Minimum (In Naira)	Maximum (In Naira)	Mean (In Naira)	
Ekiti LGA	0	30,000	4,368	57.3
Osi	1,200	30,000	7,386	61.8
Eruku	0	15,000	6,018	63.6
Obbo Ile	1,400	30,000	6,597	62.7
Oke Opin	0	10,000	5,656	57
Epe Opin	0	12,000	4,756	51.2
Obbo Ayegunle	0	5,000	2,522	60
Etan	0	6,000	2,796	54.1
Koro	0	5,000	1,821	53
Isapa	0	5,000	2,200	52
Isare Opin	0	5,000	4,105	60.1
Ilorin East LGA	0	15,000	4,512	52.3
Oke Oyi	1,400	15,000	6,247	60
Iponrin	1,800	12,000	7,120	60
Panada	0	10,000	4,591	63.6
Apado	0	6,000	3,683	33.3
Oke Ose	2,000	12,000	5,286	57.1
Agbeyangi	0	8,000	4,200	60
Budo Oyo	0	10,000	4,200	52.8
Marafa	0	10,000	6,500	50
Alalubosa	0	12,000	4,926	28.6
Budo Are	0	7,000	3,857	57.1
Kalama LGA	0	50,000	5,082	65.0
Kalama	3,000	50,000	9,375	73.5
Moshi Gada	0	6,000	1,333	72
Venra	0	10,000	4,688	70
Aboki	2,000	50,000	8,785	72.7
Gwana	3,000	30,000	6,250	60.5
Aderan	0	12,000	5,750	57.7
Banni	0	10,000	1,846	50
Kemenji	0	15,000	3,777	68.2
Kanikoko	0	20,000	5,500	61.5
Olokotun	0	10,000	3,153	64.2

Source Field survey, 2011

The fifteen variables earlier identified were used for the analysis of impact of IMT on rural income generation. The result of the principal component analysis shows that six factors were extracted from the fifteen variables and accounts for about 72.2% of the total variance in the selected variables (Table 4).

Table 4: Factors determining access to additional income from ownership of IMT in rural areas of Kwara State

	Factors					
	1	2	3	4	5	6
AGE	.038	.071	-.263	-.062	-.744	-.194
DSMR	.300	-.815	-.122	.307	.108	.083
ICMOC	.321	-.098	.709	-.012	.338	-.135
MCOW	<u>.873</u>	-.001	.334	.165	.092	.044
BCOW	.702	.042	.315	.178	-.030	.067
DSMM	-.163	<u>.789</u>	-.096	-.197	.082	.095
SEX	-.017	-.306	.009	-.025	.081	<u>.904</u>
RDLG	.322	.758	-.149	.115	-.020	.080
RDCR	.079	-.472	.187	.658	-.149	.185
NTSR	.031	.111	.134	<u>.844</u>	.143	-.094
RGTSR	.100	-.323	-.040	.749	-.094	.019
EDL	-.070	.183	-.428	-.168	.534	-.324
VOC	.242	.033	.794	-.027	.370	-.045
FMSZ	-.153	.141	<u>-.800</u>	-.193	.195	-.253
HSZ	.793	.046	-.031	-.139	-.234	-.177
Eigen Values	2.471	2.390	2.329	1.996	1.214	1.146
% Variance	15.445	14.938	14.554	12.478	7.590	7.160
% Cumulative Variance	15.445	30.384	44.938	57.415	65.005	72.166

Source: Field survey, 2011

The first factor has the highest loading on Motorcycle Ownership (MCOW) (Table 4). The second factor is most strongly loaded on Distance to Motorable Road (DSMR). The third factor is strongly loaded on Farm Size (FMSZ). The fourth factor has its strongest loading on Nature of Transport Service (NTSR). The fifth factor is strongly loaded on Age of the Head of Household (AGE). The sixth factor is strongly loaded on Sex of Head of Household (SEX).

The result of the stepwise regression indicates that only five variables can be used to predict access to additional income from ownership of IMT in the area. As shown in Table 6, x_4 (Motorcycle Ownership), x_2 (Distance to Motorable Road), x_1 (Age of Head of Household), x_7 (Sex of Household Head) and x_{10} (Nature of Transport Service) were found to be significant.

Table 5: Variables controlling access to additional income from ownership of IMT in rural areas of Kwara State

List of variables	Parameter estimate	Standard error	R	R ²	% contribution	% cumulative contribution
Intercept	6580.586	119.072				
x_4	4545.628	119.181	0.765	0.585	58.5	58.5
x_2	2018.682	119.181	0.837	0.701	11.6	70.1
x_1	1593.816	119.181	0.879	0.773	7.2	77.3

x_1	490.603	119.181	0.883	0.780	0.7	78.0
x_{10}	337.149	118.181	0.885	0.783	0.3	78.3

Source: Field survey, 2011

The result of the multiple regression analysis in Table 5 shows that Motorcycle Ownership (MCOW or x_4) has a correlation coefficient of 0.765 and coefficient of determination of 0.585. With the highest contribution of 58.5% to the variance this is the best predictor of factors determining opportunity for additional income in the area. Evidence from the study area shows that, many settlements with high IMT ownership also recorded higher mean additional incomes. Examples include Osi, Eruku, Oke oyi, Iponrin, Kaiama and Gwaria (Table 3). IMT ownership has been found to improve mobility and enhance opportunities for off-farm employment (Cervero, 1992 and Ipingbemi and Aloba, 2005). Distance to Motorable Road (DSMR or x_2) contributes additional 11.6% to the variance. Distance to Motorable Road which is closely associated with Distance to Major Market and Road Distance to LGA headquarter relates negatively with opportunities for additional income. Many of the villages with low mean additional income in the area (e.g. Koro, Etan, Budo Are, Banni, kemeni and Olokokotintin) are located far away from major roads. This is also in line with the findings of Kwom (2001) who observed that households in communities with adequate roads are known to have better off-farm opportunities, higher incomes and lower poverty levels.

Age of Household Head (AGE or x_1) offers additional 7.2% to the explanation. This suggests that opportunity for additional income rise with increasing age of the household head at least up to a certain level in the study area. Welfare of members of rural households in Nigeria is known to rise with increase in the age of head of household up to a certain level before it starts to fall (Oni and Yusuf, 2007). Sex of Household head (SEX or x_7) contributes additional 0.7% to the variance. It implies that being male increases opportunity for getting additional income in the area. Meanwhile strong cultural constraints are found to limit the use of IMT by women to alleviate their transport burden in Sub-Saharan Africa (Dawson and Barwell, 1993 and Barwell, 1996). This is supported by evidence from the study area since only 19% of the female headed households were found to possess IMT in the area. This is expected because; a woman who bears the burden of providing for her family without a partner would not likely be able to afford the cost of a motorcycle or bicycle. Furthermore, there is higher possibility of males travelling far outside their villages to seek for off-season employment than the females. For instance, in a study in Kenya Airey and Cundill (1998) observed that a new road and introduction of motorized transport sharply increased long distance travel by men in the area.

Nature of Transport Services (NTSR or x_{10}) jointly contributes 78.3% to the variance with the other four variables. The positive relationship with additional income suggests that better transport facilities increase the opportunity for making additional income in the area. Households located closer to major roads and with better transport services tend to have better access to opportunities for paid employment and generally have higher levels of wellbeing than others (Ellis, 1997).

The regression equation could be written as:

$$Y = 6580.586 + 4545.628\text{MCOW} - 2018.682\text{DSMR} + 1593.816\text{AGE} + 490.603\text{SEX} + 337.149\text{NTSR}$$

$$(R^2 = 0.783, SE = 119.072)$$

The equation implies that opportunity for additional income rise with increase in level of personal mobility in terms of access to IMT in rural areas of Kwara State. It however reduces with remoteness from major roads, market centres and centre of regional administration. Opportunity for additional income also increases with increase in age and it is higher for males than females. Also, greater access to better transport facilities increases opportunities for additional income in the study area.

Conclusion

In conclusion, the availability of IMT in the household was found to improve the level of personal mobility thereby, increasing opportunities for income generation.

These findings therefore confirm that better access to IMT to raise level of personal mobility helps to further improve opportunities for agricultural and off-farm income generation and enhance general wellbeing in rural areas of Kwara State. It was however further observed that better transport facilities; nearness to major centres and being male also raises the opportunity for additional income in the area.

It is therefore suggested that provision of rural road transport infrastructure should not be limited to road improvement but, should be extended to improving the condition of footpaths, tracks and foot bridges which all play very important roles in satisfying the transport needs of rural dwellers in Kwara State. This is because a great part of rural travel in the area is usually on foot and through the use of motorcycles, bicycles and other IMT along footpaths and tracks.

Adoption of the use of other forms of IMT in addition to those commonly in use in rural areas of the State should be encouraged. For instance, adoption of motorcycle trailers, bicycle trailers and other simple vehicles that can operate

effectively on rural roads and tracks will improve load carrying capacity. This will be especially very useful during harvest time and for marketing activities.

In addition, since motorcycles, bicycles and other vehicles are either imported or merely assembled in Nigeria, policy measures like lower import duties will help reduce price and cost of spare parts. This will make them more affordable to rural dwellers thereby, improving the level of personal mobility of the people.

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