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Full Length Research Paper

Rural Access Economic Prioritization in Zamfara State

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ABSTRACT: Accessibility is a measure of how easy it is to get somewhere in less time and with less effort, whereas Mobility is a measure of how easily individuals can move around. Isolation may result from a lack of accessibility and mobility, limiting access to essential health, education, safe drinking water, and other social services. Rural Access and Mobility's goals are to develop basic infrastructure, reduce poverty, and foster an investment-friendly climate. A number of suitable rural roads in Zamfara State were discovered, vetted, and ranked using the basic access approach and the Multicriteria method (MCA) of prioritisation of potential interventions. The MCA method of prioritization prioritized the candidate roads fairly for the three senatorial districts in Zamfara State, taking into account the Economic and Social advantages, Demographic distribution, and Environmental sustainability. Out of the basic inventory data of rural roads analyzed in the State, 21 No roads totaling 510Km of rural infrastructure were visually assessed and electronically geo-referenced. The need for a collaborative effort between the Federal Government of Nigeria, States, Local Governments, and other donor agencies in commissioning consultants to undertake Topographical Digital Mapping of the nation's rural communities is an important observation made during the course of the Prioritization Study. This will go a long way toward overcoming the data accessibility, reliability, and affordability gaps for future project implementation success.

Keywords: Prioritization, rural access, mobility, economic, infrastructure, social benefit poverty

INTRODUCTION

Studies in Rural Travel and Transport have identified four important movements related to rural transport, topmost in importance are the movements associated with activities basic to human survival. Following closely are the movements by rural dwellers to markets and social facilities these movements are regarded as movements within rural areas by rural dwellers. The other two important movements relate to movements out of and into the rural areas by the rural dwellers and the outsiders respectively (African Development Fund, 2007). A greater percentage of Nigeria's population is rural; these rural dwellers are dotted across the country in small settlements and villages engaged in one or more forms of agricultural productions. Agricultural production sites are often isolated from markets and social centres due to lack of supporting infrastructure (Figures 1-4). Rural access and mobility project is aimed at providing basic access to connect the teaming farming population through the provision of adequate transport facilities with consequent positive impact on socio-economic empowerment and poverty alleviation (Lebo and Schelling, 2001). About seventy percent (70%) of Nigeria's population is dominated by rural population mostly engaged in Agricultural production contributing to the National Food Security and the country's Gross Domestic Product GDP (Odoki, 2008). Rural Transport Infrastructure has been identified as critical to the national economic development. The current deplorable or near absent functional rural roads is weighing heavily on the overall transport cost of the rural populace and consequently the national economy. The aim of the study is to provide basic access to the teaming farming population. Closely tied to the above aim, the objectives of the project are as follows:

Figures 1and 2: Villagers commuting to a local market

Figure 3: Local transport mode

Figure 4: Transporting agricultural produce to local markets

i. Support entrepreneurship
ii. Improve delivery of basic social services
iii. Improve basic infrastructure
iv. Ensure sustainability of the environment and natural resources.
v. Create an investment friendly environment

METHODOLOGY

To achieve the stated objectives of this study, an effective methodology is paramount to the success of the project. The adopted methodology was aimed at efficient harmonization of the key project milestones in relation to available human resources, equipment and time utilization towards the delivery of the research project.

Broadly speaking the adopted methodology considered the following:

- *Visitations to government ministries and Agencies*
- *Documented data collation and Desk study*
- *Project Prioritization*
- *Stakeholders Workshop*
- *Field Reconnaissance Survey of Selected Routes*
- *Data/Economic Analysis of Selected Routes*
- *Documentation*

PROJECT DESCRIPTION

The aim of the proposed research project is to improve rural access through the identification of intervention areas and selection of High Priority Rural Roads in the North West Zone and Zamfara in particular. Zamfara is a State replication of greater priority accorded to the provision of basic rural access to and from major Agricultural production sites. Infrastructure linking National Food Security sites, Fadama III Programme, and other socio-economic sites were accorded priority in screening and ranking of potential rural road projects

Study area

Zamfara was carved out of Sokoto State on October 1st, 1996 by the then regime of General Sani Abacha. Its capital is Gusau. Major towns include Kaura Namoda, Anka, Talata Mafara, and Zugu. Zamfara State is divided into 14 local government areas. The people of Zamfara are predominantly Hausas of Zamfarawa Gobirawa, Burmawa, Katsinawa, Garewa, Zazzagawa, Wadejawa and Dara Bazawa which forms 75% of the population. Fulanis are the next major indigenous tribe representing about 15%. The remaing 10% are made up of other Nigeria tribes mainly Beri-Beri, Kanuri, Nupe, Yoruba, Igbos, Tivs, Idomas and Igalas (Table 1).

Table1: The population, total land area and population density of Zamfara State by local government based on 2006 national population census.

S/No.	L/Govt.	2006 Population	Area (Sq.km)	Population per Sq.km
1	Anka	143,637	2,746	52
2	Bakura	187,141	1,366	137
3	Birnin Magaji	184,083	1,188	154
4	Bukkuyum	216,348	3,214	67
5	Bungudu	258,644	2,293	113
6	Gummi	206,721	2,610	79
7	Gusau	383,712		
8	Kaura Namuda	285,363		
9	Maradum	207,563	2,728	76
10	Maru	293,141	6,654	44
11	Shinkafi	135,964	674	201
12	Talata Mafara	215,650	1,430	151
13	Tsafe	266,921	1,698	157
14	Zurmi	293,977	2,834	104
	Total	3,278,865	29,435	1335

Figure 5: Map of Nigeria showing Project Location: Zamfara.

Location and access

The State is located at approximately latitudes 10^0N and 30^0N and Longitudes 3^0E and 6^0E. It is situated in the north western flank of the country and is bordered in the North by Sokoto State, West and South by Katsina and Kaduna States respectively. The State occupies 39,762 square kilometers landmass.

Zamfara State capital is accessible by roads from other parts of the country. Pipe borne water is available in most of the Local Government headquarters, while electricity is provided from the National Grid or via Rural Electrification Board (REB) Scheme generators. Through various rural development projects, the State Government has provided an extensive network of feeder roads to assist in transport of raw agricultural crops to consumption centers. Good network of urban roads has been constructed in virtually all the major towns of the state. However, the rural roads are less accessible (Figure 5).

Study of Zamfara State economic potential

The appraisal of the economic potential of the state's distinct zones is an important component in establishing the purpose of the Desk Study. The findings of this study served as the foundation for screening and ranking possible priority projects (Tighe, 2006a).

Economy

Zamfara State has an agriculturally viable environment

Table 2: Agro and mineral raw materials available in Zamfara State.

S/N	Local Govt.	Agro Raw Materials	Mineral Raw Materials
1	Anka	Sorghum, Maize, Millet, Cotton, Groundnut, Sheanut, Cowpea, Beans, Mango, Rice, Cassava, Spices, Fishery, poultry, Cattle, Sheep, Goat, Camel	Alluvial Gold, Granite, Chromite, Charnockite
2	Bakura	: Guinea Corn, Maize, Millet, Rice, Mango, Locust Beans, Fishery, Cow pea, Sugar cane, Livestock, Hides & Skin, Sheanut	Ball clay
3	Birni-Magaji	, Maize, Millet, Beans, Mango, Poultry, Fishery, Livestock, Cotton, Groundnut	Gold, Ball Clay
4	Bukkuyum	: Maize, Millet, Guinea Corn, Cow pea, groundnut, Kenaf, Locust Beans, Hides & Skin, Gum Arabic, Livestock, Honey	Mica, Granite, Silica Sand, Alluvial Gold, Quartz
5	Bungudu	Cotton, Millet, Groundnut, Sorghum, Maize, Cowpea, Locust Beans, Hides & Skin, Livestock, Vegetables.	Granite
6	Gummi	Calabash, Guinea Corn, Millet, Cowpea, Rice, Sugarcane, Maize, Tomatoes, Locust Beans, Hides & Skin, Livestock, Vegetable	
7	Gusau	Guinea Corn, Millet, Maize, Cowpea, Cotton, Groundnut, Tomatoes, Locust, Beans, Hides & Skin, Livestock, Vegetable	Feldspar, Granite
8	Kaura-namoda	Guinea Corn, Millet, Maize, Cotton, Locust Beans, Tobacco, Hides & Skin, Mango, Fishery, Livestock, Vegetable.	Gold, Granite
9	Maradun	Guinea Corn, Millet, Maize, Beans, Mango, Poultry, Fishery Livestock, Cassava, Tomatoes, Sheanut.	Ball Clay, Granite
10	Maru	Guinea Corn, Maize, Millet, Cotton, Groundnut, Sheanut, Cowpea, Poultry, Fishery, Livestock, Vegetable.	Gold, Granite, Chromite
11	Shinkafi	: Rice, Maize, Wheat, Fishery, Beans, Groundnut, Guinea Corn, Tomatoes, Cassava, Millet, Potato, Sugarcane, Hides & Skin, Sorghum, Mango, Livestock, Vegetable	Granite
12	Talata-Mafara	Sorghum, Millet, Maize, Beans, Mango, Rice, Wheat, Groundnut Guinea Corn, Tomatoes, Cassava, Millet,Poultry, Fishery, Cattle	
8		Sheep, Goat, Camel	
13	Tsafe	Guinea Corn, Maize, Millet, Cowpea, Cotton, Groundnut, Locust, Beans, Bagaruwa, Gum Arabic, Hides &Skin, Spices, Vegetable	Granite, Gold, Gemstone
14	Zurmi	: Maize, Cotton, Hides & Skin, Guinea Corn, Millet, Livestock Vegetable	Kaolin, Feldspar

Source: www.rmrdc.gov.ng

since it is endowed with high soil fertility, vast farm lands and economically viable rivers sheltered by fine tropical climate. Owing to these factors, agriculture has remained the major source of revenue and indeed the backbone of the economy of the state. Major agricultural crops in the area are millet, guinea - corn, maize, rice, groundnut, cotton, tobacco and beans. Industrial concerns exist in the state and these include a modern bakery in Gusau, Gusau Oil Mill, which is first vegetable mill in Nigeria to extract oil from cotton seeds, Zamfara Textile Industries Limited, Gusau and the Gusau Sweets Factory and the Cotton Gingery at Gusau (Tables 2-3). The inhabitants of Zamfara State also weave and sell locally dyed and designed textiles, as well as other types of woven handicrafts, which are frequently created from date palm raffia. The Zamfara Agricultural Development Authority is in charge of carrying out the state's agricultural policy. The presence of favorable environmental characteristics that attract the greatest concentration of cattle and other animals has made the state a primary raw material source for dairy-

Table 3: Mineral raw materials available in Zamfara State

S/N	Local Govt.	Mineral Raw Materials
1	Tsafe	Muscovite, Schist & Quartzite.
2	Shinkafi	Aluminium
3	Zurmi	Sandstone, Clay & Shads
4	Talata Mafara	Aluminium
5	Gummi	Clay, Grits, Pebble & Aluminium
6	Maradun	Medium coarse, Grained biotic & Biotite
7	Anka	Clay & Sand
8	Birnin Magaji	Hypersther, Quartz & Dionite
9	Bungudu	Sandstone, Clay & Shads

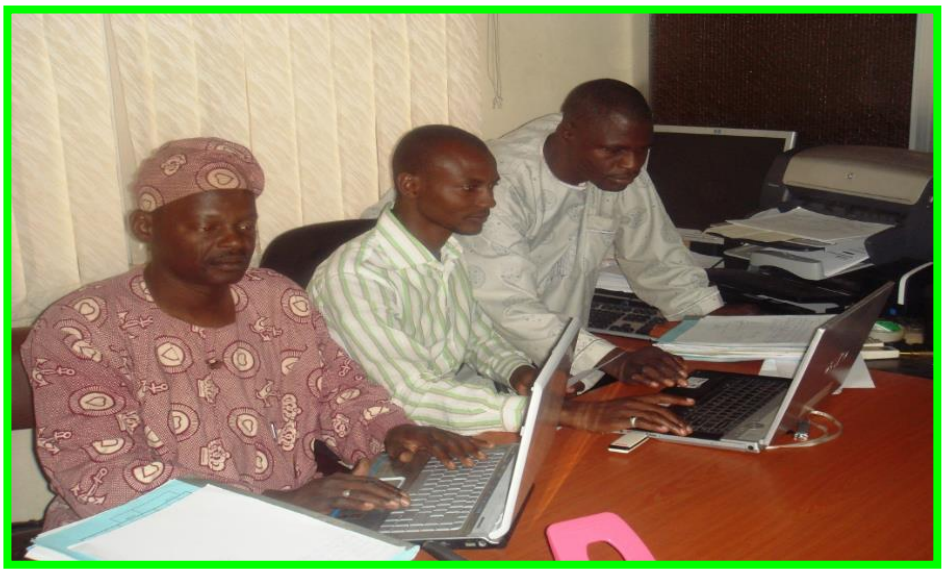

Figure 6: Data management in progress.

products enterprises. Alluvia Gold, Granite Rock, Chromate, Chemovate, Clay, Mica, Silica, Feldspar, Gypsum, limestone, Kaolin, Bronze, and Spring Water are among the state's mineral resources. One of Zamfara's key visions and missions is to maximize agricultural potential in order to achieve food security, offer gainful employment, and improve and sustain the people's living conditions. This cannot be fully realized until the State Economic Empowerment and Development Strategy is properly supported (SEEDS). Zamfara State Economic Empowerment and Development Strategy (ZAMFARA – SEEDS) was developed as a supplement to National Economic Empowerment and Development Strategies (NEEDS) in response to the demands and problems of the state and its people. This is more of a purposeful attempt to maximize the State's abundant natural and human resources in order to foster economic progress. The objectives of Zamfara – SEEDS are poverty eradication, wealth creation, human resource development, institution reforms, promotion of service delivery and collaborative arrangement and private sector and other service providers (Vande, 2002). The aim is to ensure the attainment of millennium Development Goals (MDGs) (Riverson, 1991).

Desk study

A better comprehension of the State's economic potential is a key step towards identifying possible areas of intervention (Figure 6). Accordingly, this Desk Study was focused on a careful study of available documented data, data entry and management and delineation of the state in to the identified intervention areas in line with the existing senatorial zones and local government councils within the State (Airey and Taylor 1999).

Priority in indices and Ranking of potential interventions

Using excel spreadsheet named the Ranking table, individual interventions were scored in accordance to the priority indices detailed above. The first ranking table shows the maximum marks scored by individual projects

Table 4: Summary of obtainable ranking marks.

Priority Index	Score (%)
Economic Criteria	50
Access to Basic Social Amenities	25
Local Population	15
Environmental Sustainability	10

Table 5: Summary of general project inventory.

Road Class	Surface Type	No of Roads	Approx. Distance(Km)
	Paved	7	885
Federal	Unpaved	1	150
	Paved	15	209.52
State	Unpaved	Nil	Nil
	Paved	13	136.5l
Local Government	Unpaved	174	1,659.615

Table 6: Prioritized list of projects.

S/No.	Senatorial District	L.G.A.	Project/Route Name	Surface Type	Approx. Length(Km)
1	Zamfara North	Kaura Namoda	S/Gari Kaura Namoda - Jazankawa	Untarred	10
2	Zamfara North	Kaura Namoda	Unguwar sarki mussulumi – Dagwarawa – Tungar magaji – Tashar ladan junction	Untarred	40
3	Zamfara North	Zurmi	Zurmi – Tumfa - Kalage	Untarred	39
4	Zamfara North	Shinkafi	Jangeru - Badarawa - Kware - Kurya - Mashema - Store Road	Untarred	31
5	Zamfara North	Birnin magaji	Chigama – Nassarawa godel	Untarred	13
6	Zamfara North	Birnin magaji	Dauran – Birnin magaji	Untarred	18
7	Zamfara North	Birnin magaji	Birnin magaji - chigama	Untarred	13
8	Zamfara Central	Gusau	Gusau dam – Dokau – Dumma	Untarred	18
9	Zamfara Central	Gusau	Mada - Bawo	Untarred	23
10	Zamfara Central	Gusau	Gusau – Rijia – Gidan dawa	Untarred	35
11	Zamfara Central	Maru	Dansadau - Mutunji	Untarred	18
12	Zamfara Central	Bungudu	Main road(SKT-GUS) - Furifuri	Untarred	3
13	Zamfara Central	Bungudu	Keku - Bingi	Untarred	18
14	Zamfara Central	Tsafe	Tsafe – Maraban – Yanwaren daji – Kullutu – Tafkin kazai	Untarred	40
15	Zamfara West	Talata Mafara	Mafara - Sauna - Morai - Kagara	Untarred	34
16	Zamfara West	Bukkuyum	Zuramai – Farnanawa – Dargaje - Danzamau	Untarred	21
17	Zamfara West	Bukkuyum	Nassarawa - Ruwanana	Untarred	26
18	Zamfara West	Bakura	Yarkufoji - Bakura	Untarred	18
19	Zamfara West	Maradum	Faru – Jihiya – Magami - Matseri	Untarred	30
20	Zamfara West	Anka	Anka - Rafingero	Untarred	28
21	Zamfara West	Anka	Kwanar maje - Matseri	Untarred	16
	Total Length of prioritized projects				**510**

which are the summation of the four priority indices (Larcher 2010). Obtainable marks from these indices are summarized in (Table 4).

Initial prioritization

Screening of potential priority interventions

The prioritization process includes screening and ranking of potential interventions. The first stage of prioritization is the screening exercise which can be likened to removal of outlier interventions based on the adopted screening criteria described above (Hindson, 1983). As at the time of data collation and reporting, a total of 1,035km of Federal road, 209.52Km of State road and 1,796.125Km of local government roads were recorded in the general inventory table. summarized in Table 5 below. From the general inventory, candidate roads were screened leading to the formation of screening table. At the screening stages identified projects which are already surfaced, newly

Table 7: Schedule of selected and surveyed priority projects.

S/N	SENATORIAL DISTRICT	L.G.A	POPULATION	ROUTE/PROJECT NAME	APPROXIMATE LENGTH(Km)
1	Zamfara North	Kaura namoda	285,363	S/garin Kaura Namoda - Jazankawa	10
2	Zamfara North	Kaura namoda	285,364	Ungwa Sarkin musulumi - Dagwarwa - Tungar magaji - Tashar ladan junction	40
3	Zamfara North	Shinkafi	135,964	Jangeru - Badarawa - Kware - Kurya - Mashema - Store Road	31
4	Zamfara North	Zurmi	293,977	Zurmi - Tumfa - Kalage	39
5	Zamfara North	Birnin Magaji	184,083	Chigama - Nasarawa Godel	13
6	Zamfara North	Birnin Magaji	184,083	Dauran - Birnin Magaji	18
7	Zamfara North	Birnin Magaji	184,084	Birnin Magaji - Chigama	13
				SUB-TOTAL LENGTH	164
8	Zamfara Central	Gusau	383,712	Gusau Dam - Dokau - Dumma	18
9	Zamfara Central	Gusau	383,714	Mada - Bawo	23
10	Zamfara Central	Gusau	383,715	Gusau - Rijia - Gidan dawa	35
11	Zamfara Central	Maru	293,141	Dansadau - Mutunji	18
12	Zamfara Central	Bungudu	258,644	Keku - Bingi	36
13	Zamfara Central	Bungudu	258,646	Main Road(SKT- GUS) -Furfuri	3
14	Zamfara Central	Tsafe	266,921	Tsafe - Maraban - Yar wen daji - Kullutu - Tafkin kazai	40
				SUB-TOTAL LENGTH	173
15	Zamfara West	Talata Mafara	215,650	Mafara - Sauna - Morai - Kagara	34
16	Zamfara West	Bukkuyum	216,345	Zarumai - farnanawa - dargaje- danzamau	21
17	Zamfara West	Bukkuyum	216,345	Nasarawa -Ruwan rana	26
18	Zamfara West	Bakura	187,441	Yarkufoji - Bakura	18
19	Zamfara West	Maradun	207,563	Faru - Jihiya - Magami - Maradun	30
20	Zamfara West	Anka	143,638	Anka - Rafin gero	28
21	Zamfara West	Anka	143,638	Kwanar Maje - Matseri	16
				SUB-TOTAL LENGTH	173
				GRAND TOTAL LENGTH	510

constructed or undergoing construction by other agencies were screened out (Keller and Sherar, 2003) (Table 5).

Final prioritization of projects

Ranking of potential Projects

The final prioritization of projects considered the list of screened project interventions, after due consideration to the economic criteria, access to social amenities, local population and environmental sustainability criteria highlighted, individual project interventions were selected based on the maximum score recorded (Prozzi and Harrison, 2004). A total of Twenty-One (21) projects approximating to about 510Km of rural Local Government roads were selected based on candidate scores. Table 6 presents the summary of selected interventions through ranking of candidate projects. It is noteworthy that, a review of these selected prioriority project list became necessary while on reconnaissance survey due to the actual situation encountered on site in (Table 7) which may

require reconsideration of other equally likely route alternatives.

Conclusion

It is incredibly illuminating to witness the extent of isolation and the need for Accessibility and Mobility widespread among the rural agricultural people in Nigeria's North-western region during the course of this study. Rural access replication in the Northwest is technically viable, environmentally sustainable, socially and economically justifiable, as evidenced by the initial Desk Study, the subsequent reconnaissance assessment of selected routes, and the overall appraisal exercise. The proposed project has the potential to positively impact rural transportation, thereby enhancing the movement of goods and services, poverty alleviation, and improvements to basic infrastructure within the benefiting communities, in accordance with the National Policy on RTT and the objectives of rural access. The amount of enthusiasm displayed by the stakeholder groups is significant, indicating more local support for the proposed project's long-term viability and upkeep.

Recommendations

It is recommended that the Federal Government in collaboration with States, Local Governments and other donor agencies should commission consultants to undertake the Topographical Digital mapping of the nation’s rural communities. This will go a long way in bridging the gap of data inaccessibility, reliability and affordability for the successes of future project implementations. In project of this nature, it is paramount for the awarding agency to specify possible limiting criteria in terms of the project length, cost or absolute importance to socioeconomic development. It is expected that the adopted limiting criteria shall consider the economics of available resources and equitable distribution of projects with the aim of maximum positive impact to the socioeconomic wellbeing of the benefiting communities.

REFERENCES

Airey, T. and Taylor, G. (1999). Prioritization Procedure for Improvement of Very Low-Volume Roads. *Transportation Research Record,* 1652, 175-180.

African Development Fund, (2007). Rural Access and Mobility Project appraisal Report. Infrastructure Department, Transport Division No1.Retrieved February 25th 2010 from http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/NG-2007-038-EN-ADF-BD-WP-NIGERIA-RURAL-ACCESS-AND-MOBILITY-PROJECT.PDF

Hindson, J. (1983). Earth Roads: Practical Guide to earth roads construction and maintenance. London: Intermediate Technology Publications, 3rd edition.

Jones, T.E. and Parry J. D. (1993). Design of Irish bridges, fords and causeways in developing countries. Highways and Transportation, Overseas Centre Crowthorne: Transport and Road Research Laboratory.

Keller, G. and Sherar, J. (2003).Low-Volume Roads Engineering: Best Management Practice Field Guide - US Agency for International Development (USAID) Retrieved December 20th 2010 http://ntl.bts.gov/lib/24000/24600/24650/Chapters/A_Cover.pdf

Larcher P. (2010). Low Cost Structures: A review of existing books, manuals and design guides - *MART Working Paper No. 13* Loughborough: Institute of Development Engineering, Loughborough University, Leicestershire. Retrieved December 20th 2010 from http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_policy/---invest/documents/publication/wcms_asist_9592.pdf

Lebo J. and Schelling D, 2001.Design and Appraisal of Rural Transport infrastructure: Ensuring Basic Access for Rural Communities. *World Bank Technical Paper No 496.* Washington D.C.

Odoki J.B. (2008). Towards the Mainstreaming of an Approach to include Social Benefits within Road Appraisal: A Case Study from Uganda- *Transport Papers series* World Bank Publication No 44542. Washington D.C.

Prozzi J.and Harrison R, (2004). Prioritizing Rural Infrastructure NeedsRetrieved February 25th 2010 from http://www.utexas.edu/research/ctr/pdf_reports/0_4169_P3.pd

Riverson J. (1991). Rural Roads in Sub-Saharan Africa. - *African Technical Department Series. World Bank Technical Paper 141.*World Bank

Tighe D, (2006a). Roads and Poverty Reduction. Retrieved February 25th 2010 from http://www.ruralroads.org

Vande W D, 2002.Choosing Rural Roads investments to help reduce poverty.. *World Developm*