

# An Assessment of Rural Road Networks Management in Uganda as a Driver of Economic Development: A Case Study of Kabarole District

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**Abstract** Rural roads form the largest part of the road network and the main form of access to the rural communities. The poor state of rural road networks not only affects transport of goods and services but also the economic growth. This study sought to assess rural road network management as a driver of economic development using Kabarole District as a case study. A mixed design method was used where qualitative and quantitative data was collected by use of interviews and questionnaire. The population composed political and technical staff involved in rural road management which was represented by a sample size of 95 people. Findings established that the roads in the study area are passable although they quickly deteriorate due to lack of maintenance and heavy rains. The report indicates that high construction costs ( $\mu=4.22$ ), delayed releases ( $\mu=3.91$ ), insufficient funding ( $\mu=3.79$ ), bad weather ( $\mu=4.0$ ) and inadequate equipment ( $\mu=3.56$ ) are the major factors affecting effective rural road management. A methodology was developed considering roads as capital investment where maintenance will be valued above new construction. The study recommends an effective maintenance culture, introduction of public private partnerships in the road maintenance works and encouragement of public participation in the provision of basic facilities through various community self-help developments to reduce dependence on central government. If equal attention was paid to the development and maintenance of the rural roads in Uganda there would be sufficient, safe and reliable physical access to social services; reduced travel time that would be used for wealth creation.

**Keywords** Rural roads networks, Poor unpaved network, Economic development, Road management and maintenance

## 1. Introduction

Rural roads are the backbone of the transportation system in the World especially in developed economies. They are important to all road users such as residents, recreationists and resource managers because they make social services accessible. This is the reason why Sustainable Development Goals (SDG) number 9 emphasizes physical access through improvement of rural roads; Industry, innovation and infrastructure (UNDP, 2015). This is one of the major drivers for achieving some of the other SDGs such as; ending poverty in all its forms. Therefore the importance of rural roads extends to all aspects of economic and social development of rural communities and the entire country (World Bank Group, 2016).

Due to their importance and significant impact to development, rural roads are no longer considered a feature of agricultural policy as it is in the 1980s but they have become a critical headline indicator of development at global

level (World Highways, 2014). This is increasingly true in Africa where more than half of the population still resides in rural area and most African countries fall below the 50% margin for the Rural Access Index (RAI) (Beegle et al., 2016 and Nkomo et al., 2016). More still, field studies of immobility among women and men in rural settlements in Africa with poor road access illustrate the frustrations and the high costs of living due to poor road infrastructure (Mukiibi, 2012). This can be attributed to a number of interrelated reasons including political factors such as preference for new construction over maintenance, insufficient road maintenance budgets, lack of a maintenance culture, institutional arrangements, lack of a suitable means of motivating a strong case for funds for maintenance and ineffective rural road asset management (Burrow, et al., 2016).

There has been significant increase in mileage of rural road system in Uganda during the last 20 years mainly as a result of increment in funding of the road sector and acquisition of modern machines (Odong, 2017). In addition, there is a range of government agencies which construct or improve rural roads such as Ministries of Agriculture, Defense, Mining and Tourism. It is because of such

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initiatives that Uganda has planned to meet her vision of attaining middle income status by 2020 (Government of (GoU, 2015). Achieving this status in a country like Uganda where the majority of people lives in rural areas (UBoS, 2015) means that local people can be able to easily access social services. If the rural roads are not in good condition then the goal may not be achieved since access needs of the community will not be achieved. However in Uganda most of rural roads are not being maintained and large parts of the network are not in a good condition.

This study achieved its main objective of assessing the rural road networks management as a key driver of economic development in Uganda through four specific objectives; (1) To examine the current status of rural road networks in Uganda; (2) To establish the impact of rural road networks on economic development in Uganda; (3) To establish the factors that hinder effective rural road networks management in Uganda; and (4) To develop a methodology of improving the rural road networks for sustainable development in Uganda.

### 1.1. Problem Statement

Roads are the arteries through which the economy pulses. By linking producers to markets, workers to jobs, students to school, and the sick to hospitals, roads are vital to any development agenda (World Bank, 2015). There is a significant increase in road network in Uganda (Odongo, 2017) evidence from the network of 78,000km in 2008 to 144,785km in 2016 (MoWT, 2018). The quality and usability of this road system have a number of issues leading to being impassable most of the time. For instance, the road maintenance needs for UNRA for the FY 2017/18 was UGX 596 billion only, out of which UGX 267.8 billion was provided. This represents a 45% of the annual maintenance needs funded (MoWT, 2018). The report further put it that in the FY 2017/18, heavy rains in the upcountry especially in Kabale, Mbale, Kotido, Buvuma and Alebtong cut off roads and washed away bridges. All this required emergency interventions. Furthermore, the urban and city dwellers whose food basket is in the rural villages do not receive fresh food stuffs due to delays in transportation. This retards the rate of economic growth and may impact negatively on the achievement of the national vision. If equal attention was paid to the development and maintenance of the rural roads in all areas in Uganda there would be sufficient, safe and reliable physical access to markets and social services, improvement in quality of education and Health services, reduced travel time that would be used for wealth creation.

## 2. Methodology

In assessing the rural road networks management in Uganda as a driver to economic development, Kabarole District was used as a case study. Mixed method research design was adopted because it offers the best approach to deal with qualitative and quantitative data in the study. Using

online sample calculator taking the confidence level of 95% and margin error of 7% on a population of 181 gave a sample size of 94. Quantitative approach was used where structured questionnaires to collect primary data were utilised. Visual inspection was used to physically assess some engineering features and qualitative method was also used to capture the data that quantitative methods would not be provided by the questionnaires was used for purposes of triangulation. The data collected for the purpose of the study was adopted, coded for completeness and accuracy of information at the end of every field data collection day and before storage. The data from the completed questionnaires were studied, re-coded and entered into the computer using the Ms Excel and IBM SPSS statistics version 20 packages. Using these software packages, data was analysed and presented in form of descriptive statistics using frequency tables, bar graphs and pie charts. Qualitative and physical observations were reported as sought fit.

## 3. Analysis, Results and Discussion

The data collected from respondents composed of two sections; the general section that required their gender profile, level of education, their role in rural road network management and the duration they have lived in the area of the research. The information collected was to inform about respondents role, experience and capacity in road management, so as to understand the influence of the community and perception on the role of rural road management on economic development. The second section aimed at gathering information to answer the research questions.

### 3.1. General Information on Respondents

The majority of the respondents were male (64%) while female were only 36%. The research responses showed that many respondents had attained Bachelors Degree 45(50%), Diploma holders were 31(34%) and lower Certificates 9(10%) in different levels of competencies. Other qualifications were Post graduate Diplomas, Higher Diploma and Masters Degree level of qualification were 5(6%). Findings showed that the bigger numbers of respondents were implementers (50%) of activities in road management systems, while planners comprised of 34% and policy makers were 14%. A total of 58 male participated in the study of which 8 were policy makers, 19 planners and 30 implementers in rural road management while 32 Female participated with 5 policy markers, 12 planners and 15 implementers.

### 3.2. The Current Status of the Rural Road Networks

Objective one of the study was to examine the current status of the rural road network in terms of availability, condition and rate of deterioration. The standard accessibility measure is determined by how far an individual lives from an all weather road (World highways, 2013). An

index of within 2km implies that the community is accessing the road network. In addition accessibility was measured by how far one is to the social service facility such as school, health center, market and trading centre. For this study all rural roads that form part of the network were considered as a factor for accessibility. The condition of the road was determined by four categories; Good, Fair, Poor and Bad. Rate of deterioration was determined by considering the defecting period and the major factors that contributed to the road deterioration. Data was collected from ninety respondents except for the road network coverage that was generated from key respondents. In addition, a physical inspection for 20km was made specifically looking at the road condition. Data was analysed using excel to generate descriptive results and SPSS to generate tables. A report of physical inspection was used to interpret the results.

For the study population in the research 58% lived within 2km to the rural road while 42% lived a distance over 2km, (69%) of the respondents have access to an education center within a radius of less or equal to 2km, while (31%) were in the radius of greater than 2km; 51(57%) respondents accessed Health center within 2km while 38 (43%) were in a distance greater than 2km. 58% lived within 2km to the rural road whereas 42% lived a distance over 2km, implying that the study area was fairly connected. 62(69%) of the respondents have access to an education center within 2km, while 28(31%) were in more than 2km; 51(57%) respondents accessed Health center within 2km while 38 (43%) were in a distance greater than 2km. Over 50% of the respondents were within 2km access to a school or health unit implying that to all respondents there is accessibility to these social amenities. Table 1 and table 2 give details on accessibility to school and health center respectively.

**Table 1.** Distance of respondents' home to School

Distance of respondents to School				
		Frequency	Percent	Cumulative Percent
Distance from home to the road	≤ 2km	68	75.6	75.6
	>2km	22	24.4	24.4
	<b>Total</b>	<b>90</b>	<b>100.0</b>	<b>100.0</b>

**Table 2.** Distance of respondents' home to Health Unit

Distance of respondents' home to Health facility				
		Frequency	Percent	Cumulative Percent
Distance from home to the road	≤ 2km	55	61	61.1
	>2km	35	39	100.0
	<b>Total</b>	<b>90</b>	<b>100</b>	

The market and trading center are the common areas for economic activities such as exchange of agricultural products and other transactions; therefore accessibility is of importance. From the responses; 24 out of 49 respondents were within 2km access to rural road network as well as to the markets and the 25 were more than 2km away to the

market. 26 out of 41 their homes were more than 2km to road and more than 2km to the markets.

### 3.2.1. Road Condition

12% responded that their road network was good, 57.8% responded that the road network being fair, 24.4% had their roads in the poor state while 5.6% used bad roads. The results showed that the bigger percentage of the population consider the road network to be fair and poor (82.2%). Implying that the road network is motorable but starting to lose or have lost the engineering features such as road shape, drainage system and clearance view. Results from key respondents showed that the study area have more than 1039.8km of rural roads. The surveyed network composed of 193.7km of tertiary roads, 229.8km feeder road and 616.8km of Community Access Roads. Of this coverage only 56km (5.4%) are paved while the remaining 983.8km (95.6%) are gravel or earth surfaced. However, the key respondents reported additional un-surveyed network.

### 3.2.2. Rate of Deterioration

Majority respondents rated 1-2 years (52%) as the duration the road lasted, 30% of the respondents showed roads deteriorate within 6 months after construction, 13% indicated 3-4 years while only 4% responded that roads lasted more than 4 years. Records of feeder roads at the District Works Department indicate that most feeder roads had been reshaped within 2 years after construction an indication that the rate of deterioration is 1-2years.

46% of the respondents showed that roads deteriorated due to heavy rains, 29% responded that roads deteriorated due to lack of or poor maintenance, 19% stated poor soils and only 7% indicated heavy traffic. Under others; erosion, blockage of drainage system, livestock crossing the road were identified. Key informants reported of the scarcity of gravel and long haulage distances as a limitation to full gravelling of the road network.

From the findings, it is evident that rural road networks increase people access to social enities. However, these road networks are in poor condition because of heavy rains, lack of maintenance and deliberate blockage of drainage system. This result is in agreement with World Bank Group, (2015) report that 35000km of the rural road network in Sub Sahara Africa is in poor condition, NSDS, (2015) reported poor maintenance as the major reason for the poor state of the rural roads and Odongo, (2017) who noticed heavy rains as the major cause of road deterioration.

### 3.3. Impact of Rural Road Networks on Economic Development in Uganda

The second objective was establishing the impact of the rural road networks on economic development in Uganda. This study assessed economic development as a result of rural road networks management by considering the outcomes of economic development. The respondents rated on a scale of 1 to 5 the perceived way in which rural roads

impacted on the economic development in the last ten years, (1being very low, 2- Low, 3- moderate, 4- high and 5- very high impact). Data from the ninety respondents was entered using excel and exported to SPSS for statistical analysis. Mean values and standard deviation were generated from the data of those who took the role of implementers in the rural road network management. The mean values were ranked in descending order to indicate the perceived high to low impacted economic indicator. The standard deviation was used to determine how far the individual responses to question vary or deviate from the mean. The study further considered the social economic benefits of an improved rural road networks management. Interviews were conducted with the engineering technical staff on how rural road management had impacted on the economic development; other social benefits were identified and recorded in the results which were reported in study. Also during the site inspections some observation were recorded and presented in the report.

### 3.3.1. Impact of Rural Road Networks on Economic Development in Uganda

**Table 3.** Mean and standard deviation economic development indicator

Indicators of economic development	N	Standard Deviation	Mean $\mu$	Ranking
Access to health services	45	0.98	4.00	1
Improved standard of living	45	1.01	3.98	2
Increased agricultural production	45	1.11	3.89	3
Improved distribution of wealth	44	1.08	3.64	4
Increased standard of education	45	1.09	3.62	5
Improved Infrastructure	45	1.16	3.58	6
Increased trade and commerce	44	1.37	3.57	7
Urbanization	44	1.33	3.39	8
Population growth	45	1.14	3.38	9
Improved Tourism	45	1.51	3.11	10
Increased employment	44	1.33	3.11	11
Reduced infant mortality	45	1.24	3.09	12
Access to technical service providers	45	1.37	2.93	13
<b>Average mean value</b>			<b>3.48</b>	

Majority respondents 67(74%) indicated that roads had impacted on economic development by rating the most indicators of economic development moderate - very high while the minimal number 23(26%) rated them low and very low. The study considered those respondents who took on the role of the implementer on their views on economic development and Table 3 shows descending order of the descriptive statistics using mean as the scale of measure;

access to medical services being the first (Mean ( $\mu$ ) = 4.0), improved standards of living ( $\mu$ =3.98), Increased agricultural production ( $\mu$ =3.89), improved distribution of wealth ( $\mu$ =3.64), Increased standard of education ( $\mu$ =3.62), etc up to the least ranked occupational structure of labour force with  $\mu$ =2.93. The factors whose mean values are above the mean of means 3.48 marked by the thick line were considered more significant indicators of economic development. Since the standard deviations are all close to one, this indicates that the respondents were more in agreement that actually road management had an impact on economic development.

### 3.3.2. Other Social Benefits of Rural Road Availability

Results revealed that 93% of respondents reported that it is true roads come with amenities such as extension of electricity grid, extension of safe piped water, evenly distributed education centers, improved medical services on top of others which include Agricultural services such as NAADS and Operation Wealth Creation (OWC), growth of administrative units with associated services, increased investment opportunities and security services. The study also discovered that was purchasing agricultural produce from farm gate, collection centers and improved transport means.

Visual inspection confirmed the responses from the community by finding that buying centers had been created on the road side as in Figure 1.



**Figure 1.** Road side buying center

This is a service to the local communities who are able to sell their produce near their home and save time for other development activities. However, arising out of these road side markets was observed that there was poor management of waste material which is not good for the road surface if the trash is left to rot in the drains and on the carriageway as observed in the photo. There is also high risk of accidents as the packaging is done on the carriageway.

These findings agree with World Bank, (2015) stating that roads are vital to any development. The study results indicated a correlation with Burgess and Donaldson, (2012)

that noted improvement of road infrastructure increases agricultural trade and income, and reduce the risk of famine. Also Ghani, et al., (2015) and Stoyeygard, (2016) indicated that reducing transportation cost increased growth rates in local economic activities leading to increase demand for local non-tradable goods and increase in income. Ghani, et al., (2015) and Stoyeygard, (2016) further noted that rural roads improve access to capital which in turn raises investment in productive activities.

### 3.4. Factors Hindering Effective Rural Road Networks Management

Objective three of the study was to establish the factors hindering effective rural road networks management. Methods of maintenance that were being applied in the area were analyzed so as to identify the missing gaps and whether there was need to introduce any new method that was not being used. Known factors that hinder rural road management were identified (Njangu, 2015; Porter, 2014; Odongo, 2016 and 2017) which were used in the structured questionnaire. Respondents were requested to rank on a scale of 1-5 (1 being very low, 2 - Low, 3 - moderate, 4 - high and 5 - very high impact) in their opinion how these factors hindered effective rural road networks management. Interviews were conducted on technical staff from UNRA Fort Portal station and Works Department Kabarole District. Factors which hindered rural road management were recorded and ranked. Also as a measure of road management the study sought the planning cycle and community involvement in the rural road management. Technical personnel were also requested to suggest on what could be done to achieve effective rural road management. The data generated from the questionnaire was entered in Ms excel and imported to SPSS software where it was analysed and presented in form of descriptive statistics and correlations to establish the significance of relationship between items. Data from the interviews was analyzed and presented in the study. The results from this data were used to generate a methodology to improve rural road networks management (objective four).

#### 3.4.1. Methods of Road Management

The methods of road management identified in the study area were communal work, gang system, mechanized maintenance, periodic maintenance and rehabilitation. Periodic maintenance was reported by 21% of the respondents while routine mechanized maintenance and manual maintenance (gang systems) were reported by 44% as a combination of road management methods. According to the interviews communal/ labour based was more common in the mountainous areas where mechanised equipment cannot easily access, whereas routine manual and mechanized maintenance covered much of the study area plans due to the limited resources. These findings are similar to those by NRRDA, (2015) where it was reported that technology employed depends to the nature of work,

availability of labour and equipment in the areas. Also that a combination of labour and machine often provide the most appropriate solution. O'Neil, (2011) recommended engineers to analyse the locally available options using their experience and expertise.

Most roads of rural networks are unpaved and earth surfaced. Through field visit it was observed that roads were made of cotton black soils which can be dusty in the dry season, slippery and impassable in the wet season. This nature of soils, easily block water drainage channels especially under heavy traffic and rainy period when there is a lot of soil erosion. It is also noted that the rate of deterioration is very high if the road is not surfaced with gravel. This is a big challenge in the study area because there is scarcity of gravel (Kabarole DLG Roads and Engineering reports, 2016; 2017 and 2018).

#### 3.4.2. Factors that Hinder Effective Rural Road Networks Management

Table 4 shows the mean and standard deviations of the factors hindering effective road management. The factors with mean values above the mean of means marked thick line were considered to the most significant and with the greatest impact on effective rural roads networks management. It showed that high construction cost ( $\mu=4.22$ ) was perceived as the biggest hindrance as far as effective rural road networks is concerned and seasonal unskilled labour ( $\mu=2.48$ , S.D=1.298) also hinder effective rural road network management to a small extent. This is in agreement with Nallatginga, (2017) and NRRDA, (2015) who also found out that high cost of construction and maintenance as the major factors hindering the rural road network management. The study observed that bad weather with mean  $\mu=4$  highly affected rural road management as validated by Odongo, (2017) who noted that rains were responsible for mudslides, embankment washout, pavement submergence, bridge and culvert failure and other related damages. Similarly, Oxfam, (2013) also observed that bad weather caused weather related emergencies on rural roads.

The study results further indicated that construction materials ( $\mu=3.49$ ) and inadequate equipment ( $\mu=3.56$ ) as the major factors hindering rural road management which are in agreement with an earlier study of Njangu, (2015) who stated construction materials and machinery affect rural road network management.

However, results also indicated a low rate in mismanagement of funds of mean  $\mu=2.80$  as reflected in Uganda's President Yoweri Kaguta Museveni, (2018) national address where he highlighted that 35% of the roads under construction were being funded by GoU. The low level mismanagement of funds still agrees with Mukiibi, (2012) who stated that the revenue from the excise duty on fuel was channelled to the consolidated fund and apportioned through the normal budget process and hence reducing the percentage that would be released if the collection was done under Road Fund.



**Table 4.** Response on the factor hindering rural road networks management

Factors hindering rural road networks management	Standard. Deviation	Mean $\mu$	Ranking
High construction cost	1.074	4.22	1
Bad weather	1.234	4.00	2
Delayed release of funds	1.151	3.91	3
Insufficient funds	1.457	3.79	4
Inadequate equipment	1.194	3.56	5
Lack of materials	1.343	3.49	6
Price fluctuation	1.415	3.46	7
Geographical terrain	1.308	3.46	8
Political influence	1.466	3.39	9
Conditional fund	1.436	3.27	10
Poor construction	1.376	3.06	11
Insufficient technology	1.410	3.03	12
Institutional policy	1.259	2.99	13
Poor planning	1.364	2.84	12
Mismanaged funds	1.567	2.80	15
Absence of technical personnel	1.413	2.57	16
Seasonal unskilled labour	1.298	2.48	17
<b>Average mean score</b>		3.31	

District records showed that the study area had 80% of the Works Department structure positions filled with a substantive District Engineer, implying that there were minimal issues of human resource gaps compared to other districts in Uganda. This is also reflected in the study where absence of technical personnel and seasonal unskilled labour affects rural road network management ranked the least ( $\mu=2.57$ , S.D=1.413 and  $\mu=2.48$ , S.D=1.298 respectively) which results were much lower than the mean value of 3.31. Findings are contrary to Njangu, (2015) findings which indicate limited skilled labour as a major constraint in rural road management and NSDS, (2015) report that indicated lack of engineers as the main reason for the poor state of all types of roads. However the study results indicate that this factor does not greatly impact as a challenge.

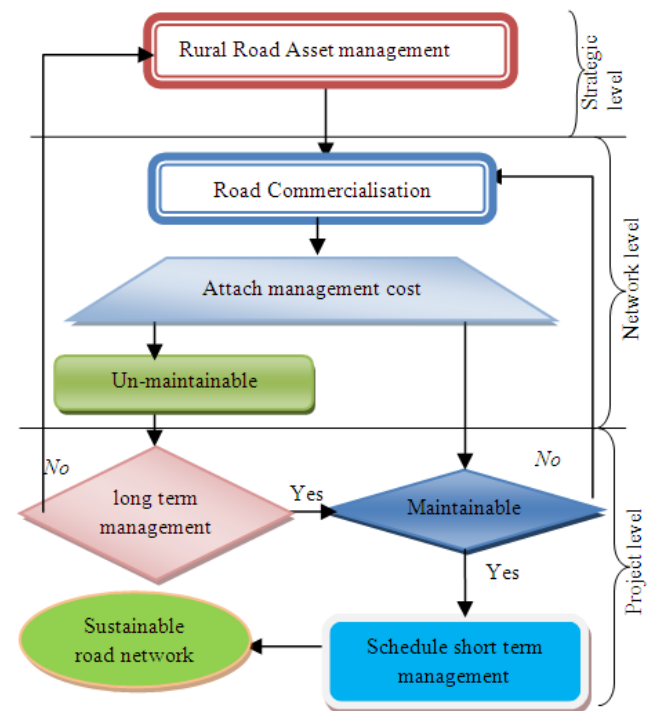
### 3.5. Methodology Proposed to Improve the Rural Road Networks Management

The proposed methodology in Figure 2 is developed to address the factors which are considered to make a great impact which is rated above the mean value of 3.31 in Table 4. These are high construction cost, bad weather, and delayed release of funds, insufficient funding, and inadequate equipment, lack of materials, price fluctuation, geographical terrain and political influence.

#### 3.5.1. Rural Road Networks Management

While developing this methodology for improving rural road networks management, three operational levels were considered; Strategic, Network and Project. At strategic level,

the missions and vision statement are developed aimed at connectivity of the rural area to the social centers and main roads. At tactical (network) level, the mission and vision are translated into objectives. It is also at this level that the rural road administration is developed to undertake a self- assessment of the organisation structural capacity and performance. Development and performance of road administrations should be dependent of: the technical ability to undertake engineering activities, the institutional, organisational and managerial arrangements, finance and human resources and external factors which the organisation has no direct control over, but which may constrain the way in which the organisation operates. While at project level, standards and interventions are selected to meet the needs of local rural road authorities. The agents' ability to make sustainable improvements to road management is linked to external factors that need to be addressed before institutional arrangements are dealt with and later technical capability is developed.

**Figure 2.** Proposed Rural Road Network Management Methodology

#### 3.5.2. Commercialisation of Roads

This study recommends management of rural roads by commercialisation, which entails management of rural roads as an asset or a business not a social service. This method is also closely related to the known Asset Management Approach. Road construction, maintenance and finance are not market-driven and there is no clear price for roads as road expenditures are usually financed through general tax revenue. Roads can be commercialised by fully enforcing the Uganda Road Fund Act, 2008. This will motivate the road agency to cut on waste, improve operational performance

and allocate resources efficiently. Commercialization of roads clarifies responsibility by assigning roles that creates ownership through road users' involvement in the road management to encourage better management; win public support for road funding, and to constrain spending to what is affordable. This results in stabilizing road financing by securing an adequate and stable flow of funds; and strengthening rural road networks management.

To achieve this a comprehensive inventory of the existing infrastructures; conditions and data collection and evaluation of the assets which will provide crucial historical information that include the cost and year of construction, materials used, design for reconstruction and repair will be generated. Local decision makers themselves should be involved in assessing the results of different allocations in terms of value of the overhead cost. Involvement of all stakeholders in the road management will minimised political influence, mismanagement of funds, poor planning and construction.

### 3.5.3. Attach the Management Costs of the Roads

Using the road condition data, maintenance costs for road sections are calculated and annual road works expenditure is developed by prioritising of the roads to be managed. Using the available funds which are less than the required, engineers will use the collected data and their expertise to make decisions and follow up activities to manage the maintainable and plan for un-maintainable road sections. A plan should be designed to manage the various levels of deterioration and attach the appropriate costs. At the beginning, only the maintainable roads should be prioritized, but over a time the full core network should be put in maintainable condition.

### 3.5.4. Maintainable and Un-Maintainable Roads

Prioritisation is based on the cost of maintenance, nature of maintenance, population served and the purpose of the road to determine the maintainable and un-maintainable road sections. Maintainable referring to where preventive measures are applicable, otherwise un-maintainable. Through cost effective ranking of road sections which match the budget ceiling, the rural road networks management plans are developed.

### 3.5.5. Schedule Short and Long Term Management

Short term should include routine and periodic maintenance while long term to cover rehabilitation, upgrading and new constructions. Generally, the maintenance plan will define responsibilities for providing the resources, and be the basis for preparing the annual maintenance plan and budget and for implementing the works. Other efforts should be made to identify additional sources of funds such as introduction of Public Private Partnership (PPP), community self-management among others to manage the un-maintainable to maintainable state. When all is done the network can be expanded.

### 3.5.6. Sustainable Road Network

A sustainable road network will be achieved only when the entire defined road network is put under maintainable condition and its operations managed within the available resources.

## 4. Conclusions

From the study findings, it was concluded that the rural road networks in Uganda were in passable state with the majority respondents accessing social economic services. More so rural roads deteriorate as a result of heavy rain, poor soils and lack of maintenance. The study also concluded that rural road management has a significant impact on economic development and social services such as extension of electricity and water, improvement in service delivery. A number of factors affected effective road networks management. These included the high costs on construction and maintenance through procurement of materials and services, bad weather, insufficient funding, delayed releases, inadequate equipment, lack of materials, price fluctuation, geographical terrain and political influence majorly hinder effective road networks management. Corruption, mismanagement of funds and political interference were among the factors.

In order to manage the rural road network, there is need to prioritize maintenance over new construction and generate options for the maintainable and un-maintainable roads. To achieve results and attract funding, stakeholders' involvement is of importance.

## 5. Recommendations

The most important aspect of ensuring effective rural road management is to develop sense of ownership among the road users by involving them in all aspects such as planning, designing, upgrading, rehabilitation and maintenance. This will also help in monitoring and reporting the defects on the road. Therefore, a need for continuous sensitisation of the public on road use and management.

From the study, it was evident that the major cause of road deterioration was heavy rains and poor or lack of maintenance. The researcher wishes to suggest the following;

- (i) An effective maintenance culture. To ensure that existing roads are kept in motorable condition, there is need to set up maintenance units within the communities responsible for rural road maintenance. Maintenance units will cover routine manual maintenance activities such as de-silting and opening drainage, vegetation clearance, culvert and bridge cleaning.
- (ii) Public Private Partnership programme is also another means of ensuring sustainable rural road maintenance. The study reveals that seasonal

unskilled labour was rated low and inadequate equipment rated high, this implies a possibility of labour based road maintenance should be encouraged.

- (iii) There is need to encourage public participation in provision of basic facilities through various community self-help development of their community to reduce on central government dependence.

The study indicated positive results to economic development, however to have sustainable development, roads need to be improved from fair or poor to good status. There is need for improvement in rural road networks management financing and to empower the grassroots governments of the importance to the fact that the biggest part of rural roads fall within their jurisdiction.

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