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Accessibility and Transport Needs of Rural People in Ghana: How Relevant Are Appraisal Models

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Abstract The focus of governments in developing countries like Ghana is on the construction of feeder road infrastructure with little or no provision for the vehicles that are needed to ply on the roads after their construction. It is generally assumed that once the feeder roads have been put in place, they will attract the private sector to complement the effort of government by operating commercial transport services on the feeder roads. However, most people living along feeder roads in Ghana face difficulties in accessing reliable transport for their social and economic needs. Through a qualitative approach, the study was done in five rural communities in two Regions in Ghana by engaging 72 participants in focus group discussions as well as 18 feeder roads experts to assess the accessibility and mobility needs of people living along feeder roads in Ghana. Responses gathered from the experts indicate that in the design of roads, the type of vehicles that are envisaged to be used on the road are factored by experts. However, issues on transportation itself, such as the use of vehicles are left to the rural people. The study revealed that feeder roads selected for construction using Government of Ghana funds are not appraised. However, roads funded by donors are always subjected to evaluation to merit their selection for construction or rehabilitation. The study concludes that road projects can have significant positive impact on people if it considers the environment, improves safety, supports sustainable economic growth, provides equal access and integrates all transport networks.

Keywords Accessibility, Appraisal, Mobility, Transport, and Rural

1. Introduction

Rural roads play a very important role in rural communities across the world by making it possible for them to access economic and social services such as education, health, and others. Most transport ministries in developing countries, particularly in Africa, have concentrated on road construction and maintenance as a measure to address rural accessibility and mobility, and to foster rural development and rural modernization. In Ghana, for example in the year 2015, out of the total national infrastructure budget of 2.06 billion GHS (approximately 822 million USD) to be shared between four ministries, the Roads and Highways Ministry alone was allocated 931 million GHS (approximately 266 million USD) [1, 2]. Similarly, in the year 2016, out of the total national infrastructure budget allocation of 1.4 billion GHS (approximately 355 million USD), the roads and highways alone were allocated 625 million GHS (approximately 156 million USD). The roads and highways comprise of trunk roads, urban roads and feeder roads. These feeder roads connect greater parts of the rural communities where about half of the nation's population live and are more than 50 per cent of the total road network [3].

Rural roads alleviate poverty through the creation of employment and economic opportunities while improving productivity of rural farmers [4]. Studies examining rural roads investment have found that it positively influences the development of poor countries and a key driver to poverty alleviation. In most African and Asian countries such as India, studies have found that rural road investment creates an opportunity for rural people to increase their income earning potential. This impact is significantly higher than investment in rural development, crops, education, irrigation or health [5]. Other studies examining the utilization of social services in countries such as Morocco and Pakistan found that an all season rural road is associated with improved quality education, high enrolment levels, and higher utilization of health services such as immunization as compared with communications with poor rural roads [6, 7].The study by Plessis-Fraissard [8] also found that in communities with poor accessibility, the development of the girl child is hampered as they are

expected to collect firewood for cooking and heating daily which negatively affects their education. In China for example, studies have shown that every Yuan invested in rural roads can lead to a 500% increase in rural non-farm GDP while agricultural GDP is increased by at least 50%. [9] Similar findings were found in countries like Vietnam and Ethiopia where the level of economic activity and consumption rises with rural roads [10,11].

In their quest to promote road infrastructural development, transport service which is a necessity for such roads have typically had little attention paid to the appraisal models used. Though research has found that whenever feeder roads are constructed, communities along the stretch get exposed to opportunities which are very significant for economic growth and development [12, 13, 14, 15, 16], negative consequences have been observed in some cases due to poor design and wrong appraisal models. In addition, scholars such as Ellis and Hine [17] have indicated that accessibility and mobility depend heavily on good roads and appropriate vehicles which should be available at the right place and time. This can be only achieved through reliable and useful appraisal of rural road investments. This study therefore addresses this gap by examining the appraisal models that may be adopted in rural road construction in Ghana.

2. Literature Review

2.1. The concept of rural roads

Rural roads play a very important role in the lives of many people particularly in developing countries where it constitutes about 80% of the total road network though it carries just 20% of motor traffic. The definition of what constitute rural roads is based on the level of development as well as the technical and socio-economic characteristics of the road. As defined by Johannessen [18], rural roads are those roads that are owned by the state which aims to provide direct access for rural communities and villages to enjoy economic and social services. The definition of ILO fails to capture some important aspects of roads and other roads owned by local assemblies and not necessarily the central government which is often referred to as rural transport infrastructure. [4] An alternative definition who sought to offer a broader understanding of rural roads is the one by International Development Association (IDA) in 2007. The IDA [19] defines rural roads as all roads other than main roads. Though this definition can be seen as comprehensive, its applications depends largely on the context. Whereas most developing countries define rural roads as unpaved low volume roads aimed at providing access to economic and social services of rural populations, developed countries on the other hand see rural roads as those with low traffic facilities which usually connect towns with low population densities [8]. For the purposes of this paper, rural roads are defined as roads that serve the needs of rural communities in a developing country irrespective of ownership.

2.2. Road transport appraisal models

Road transport is very relevant. However, a number of challenges hinder its effectiveness. The challenges, one way or the other, are linked to the various components of road transport, namely, road infrastructure, transport services, and transport service users. An appraisal of road transport must necessarily be holistic in its approach to understand the various facets that make up the whole. In this paper, a number of road transport models are reviewed with the aim to understand how those appraisal models holistically cover the components of road transport.

2.2.1. Cost-Benefit Analysis (CBA)

Derived from two words ‘cost’ and ‘benefit’, in this type of model, analysis is undertaken by comparing the cost of constructing the road with the direct benefits of the road to society or the rural community [20, 21, 22, 23]. CBA is the oldest analytical model and the most widely and frequently used analytical tool. In using this model, every possible gain and loss of a proposed road construction are identified, converted into monitory units and compared with the community benefits that will be derived from construction of the road to decide if the proposed road is necessary. There are four ways to conduct CBA. These are ‘ex-ante’, ‘ex-post,’ ‘medias res’ analysis, and ‘comparative CBA’ [23]. The ‘ex-ante’ analysis is done before a road project is executed. After the project had been executed, the ex-post analysis is undertaken to holistically evaluate the project by highlighting and learning the mistakes as well as other interventions made [23]. ‘Medias res’ analysis is performed in the course of project execution to decide whether to continue or to abolish the project, and to forecast future ‘ex ante’ by learning from the cost and benefits analysis. The last, ‘comparative CBA’, is done to compare the ‘ex-ante’ with ‘medias res’ or with ‘ex -post’ [23]. The ‘comparative CBA’ is done to generate apparatus for learning about the efficiency of CBA for decision making. Carrying out CBA is very essential; this is practical because road projects affect the welfare of three main groups such as: 1) the beneficiaries of the road; 2) tax payers or financial providers; and 3) those who become aggrieved or incur losses when the project is executed. To ensure efficient allocation of scarce resources and to address needs and challenges, all three parties must be identified; losses and gains must be calculated; and determination made whether the road to be constructed is feasible from community or society standpoint. There are various CBA models such as Highway Development Management (HDM) - III model and HDM IV.

HDM Models were developed as software tools for high traffic road development and management. The first of

such software tools HDM -III, a road management system and a decision-making tool, was intended for low income economies. It was developed by the World Bank in the 1980s. Not so long after the HDM-III had been developed, the World Bank developed HDM -IV as an enhancement and further development of the HDM -III. The HDM - IV considered three levels of analysis: namely, project, program and strategic analysis. The software tools measured performance models for paved and engineered unpaved roads. The system was favourable for high volume roads with Vehicle per Day more than 300. As a software tool, it required more complex input data and detailed economic evaluation. The software tool excluded Non-Motorized Traffic benefits and gave limited allowance for incorporation of induced or development traffic. The economic analysis undertaken by the system measured quantification of benefits and cost to road users, triggered by the level of service of road [22]. The HDM is used as a World Bank software tool to: 1) support decision making or road management and expansion of traffic capacity; 2) appraise projects; 3) develop road programmes; and 4) evaluate long term road system investment alternatives [22]. HDM is useful for high traffic volume roads appraisals, and not feeder roads or rural roads with low traffic volumes [22]. In view of this, an Alternative Impact Assessment Techniques (AIAT) was introduced to deal with feeder and rural roads.

2.2.2. Alternative Impact Assessment Techniques (AIAT)

The AIAT is suitable for developing countries, especially countries such as Africa. It is more useful for rural road analysis, where the roads are unpaved and have less traffic volume. The AIAT focuses on estimating direct and induced benefits. Its model allows diverse data collection methods and analyses. The methods of collecting data include Socio-Economic Household Surveys (SEHHS), which gives room for questionnaires to be structured in a way to obtain perceived benefits. Lombard and Coetzer [22] outlined a number of data collected on SEHHS, such as:

- impact on community activity;
- the means though which investment resolute transport constraints;
- constraints experienced due to deficiency in road investment;
- relation between proper rural roads infrastructure and poverty, and accessibility and mobility;
- effect of investment on daily activity or living conditions;
- gender influence of rural investment; and
- whether accessibility to facilities differ by income and location

There are various AIAT analyses models, significantly among which is the Road Economic Decision (RED).

A Road Management Initiative (RMI) was set up as a cooperative framework to assist road sector reforms and to foster improved resource allocations and use in Africa. RED was born as a component of Sub- Saharan Africa Transport Policy (SSATP). RED was developed by Rodrigo Archondo -Callao [24] of the World Bank. RED was developed to fulfill four objectives: 1) to make economic evaluation of low volume roads; 2) to capture economic benefits of projects; 3) to undertake risk analysis on low volume roads; and 4) to produce good sensitivity, switching values, user impacts, and distribution of benefits evaluation [23, 25]. Unlike the HDM – III & HDM – IV that focused greatly on high volume roads RED focused on low volume road, economic development, possibility, uncertainty, people served along the roads, importance of cargo, and social services [24], as summarized in Table 1 below:

Table 1. HMD Models and RED Benefits

Benefits	HDM -III	HDMM -IV	RED
Vehicle operating cost (VOC) Normal Traffic	Yes	Yes	Yes
VOC Generated Traffic	Yes	Yes	Yes
VOC Diverted Traffic	No	Yes	Yes
Passenger Time	Yes	Yes	Yes
Cargo Delay Time	Yes	Yes	Yes
Accidents	No	Yes	Yes
Non – Motorized Traffic	No	Yes	Yes
Social and Other	No	No	No

Source: (Archondo- Callao 2001)

RED used as software tools focused on low volume roads with Vehicle Per-Day count of less than 200. It required simple data input requirements and simplified economic evaluation. The software tool included Non-Motorized benefits and allowed incorporation of induced or development traffic [22, 24]. There exist other appraisal techniques used worldwide. There are several models used in road analysis globally. Generally, these models can be categorized into two, namely: road deterioration and maintenance models; and economic analysis and prioritization of rural roads. This section summarizes some of the models in terms of how analyses are made.

2.3. Feeder roads prioritization models in Ghana

Review of literature has presented three prioritization models used in Ghana. These models are: Feeder Roads Improvement Prioritization Method, Consumer Surplus Approach and Producer Surplus Approach. These modules are used to analyze road investments, especially with regards to the construction of new feeder roads, maintenance of feeder roads, and rehabilitation of feeder roads.

2.3.1. Feeder Roads Improvement Prioritization Method

The model was developed jointly by the Department of

Feeder Roads of the Ministry of Roads and Transport in Ghana, and the United Kingdom Department of International Development, in the year 1999 [32]. This prioritization method encompasses series of stakeholders' consultations, procedures, activities, and selection processes to prioritise poor or deplorable roads for improvement. It is a form of District level decentralised system with a bottom-up decision or Community-District involvement in road policy decision [32]. Organisationally, the method divided a district into ten areas, where each area was divided into ten units. The selection process commenced with nomination of roads by community members at the units; selection of two candidate roads from each unit lists at the area level; ranking of all candidate roads from the areas at the district, from which a road is selected as district candidate roads; and the district candidate roads are ranked in descending order with the aid of prioritization index (where total benefit of road is divided by improvement cost of road). The ranking and selections of roads at the units, areas, and districts are done by consensus or by pair-wise comparison using agreed criteria [32]. The pair-wise criteria used include: cost of providing access and full rehabilitation of road; the number of people living within road catchment area; and the distance of a population for essential facility. Ranked roads selected at the district were allocated 50% of project funds, and distributed in descending order until the funds are exhausted. Funds allocated served benefits such as: to open up impassable roads; to provide access for social services and facilities; and to provide easier passage for non-motorized vehicles [32]. The 50% remaining fund is used for other roads improvement works in the entire project area. Roads considered are those marked by a Central Common Fund as having high poverty incidence. Poverty is determined by using a prioritization index that has a district poverty weighting element incorporated [32].

Implementation of the model may seem to be complex especially looking at the procedures of meetings at the unit level, area level, and district level; and a lot of stakeholder consultations that are made. Notwithstanding, the Feeder Roads Improvement Prioritization Method seems to combine components of several prioritization analyses models such as Access Index, Multi-Criteria Analysis and Ranking, and Basic Access Approach, to improve on feeder roads and to address road infrastructural development challenges. Essentially, the model ensures openness and fairness in making road improvement decisions. It is devoid of political interference in road improvement decisions, often associated with corruption and bias. The model provides a road map for District road improvement that addresses relevant road infrastructural needs of District Communities; such merits are lacked by the Consumer Surplus Approach and the Producer Surplus Approach, for road improvements.

2.3.2. Consumer Surplus Approach and Producer Surplus Approach

These are very old models used for prioritization of road investment in agricultural zone areas. Under these models, construction of roads, maintenance of roads, and rehabilitation of roads, are prioritized to farm areas or communities, in order to reduce the cost of transportation and to serve as incentives for high production output. Essentially, areas with high food crop and cash crop such as maize and cocoa production are favoured. And it is based on the concept that high transport costs affect produce cost, and has consequence on production yield [32].

3. Methods

This section discusses the methodology adopted for this study. It presents a description of how the study objective was achieved. The study adopted a qualitative approach because of the need to get a detailed account of the use of appraisal models in road investments in Ghana. The qualitative research method was considered over quantitative research methods due to the nature of the research questions which required a more flexible sampling procedure, a more flexible data collection instrument, and data analysis. Such flexibility cannot be achieved with quantitative methods as it required rigid procedures. Qualitative studies are very relevant when a study seeks to explore or gather in-depth understanding of a particular issue such as this [33]. The study relied on data from both primary and secondary sources. With respect to the primary data, the study collected information through in-depth interviews whereas the secondary information was gathered from annual reports, policy documents, and research reports on rural transport and intermediate means of transport.

A purposive sampling technique was used to select respondents to be interviewed. The purposive technique allows persons from particular backgrounds to be selected to provide relevant information that cannot be obtained from other choices [34]. This technique was employed to select all participants interviewed because they were experts and have relevant information required by the study. Candidates or respondents selected were experienced and had knowledge on the issues studied. Since the topic had to do with Feeder Roads, an invitation was sent to the Director of the Department of Feeder Roads which requested for their consent and for expert respondents for the interview. A reply letter was received with a recommended list of 10 experienced and knowledgeable engineers and their phone numbers. Phone calls were made to all the 10 engineers to seek their consent, in which they all agreed to be interviewed. However, out of the 10 engineers 9 were actually interviewed, 1 of the engineers was not available because he was occupied with a lot of fieldwork.

At an annual Ghana Institute of Engineers Conference,

held in the Brong Ahafo region of Ghana, respondents' invitation letters were sent to some feeder road experts for their consent to be interviewed. The Ghana Institute of Engineer conference is held annually and brings together members of the Institution of Engineers where some were experts on the research topic. Five experienced engineers gave their consent via phone call and so were selected and interviewed. The 3 regional engineers of DFR, the Chief Director of the Ministry of Roads and Highway, and the Director from the Ministry of Roads and Highway (a former director of DFR) were all recommended by some of the experts interviewed. Invitation letters were sent to the experts who were recommended; who gave their consent to be interviewed. In all, 19 experts and experienced respondents were selected and interviewed. *Table 2* provides a summary of respondents selected.

Table 2. Respondents selected for interview

Respondents	No. of Respondents
Experts engineers from DFR (ING)	9
Expert engineers from Ghana Institute of Engineers (EGI)	5
DFR Regional Engineer (DF)	3
Director of Ministry of Roads and Highways (DR)	1

Leedy and Ormrod [35] opine that after data had been collected, a rigorous analysis of qualitative data commences to identify characteristics that may lead to categorization or development of themes. In view of this, qualitative data analysis is explained as a move away from data to meanings or representations or to a stage where explanations or understanding or interpretations of people or phenomenon are provided [36]. The qualitative data collected were analyzed by identifying themes and making generalizations based on how a particular phenomenon is perceived or experienced. The data collected was managed using NVivo 12 Plus, a software programme for qualitative data analysis. The NVivo software was used to generate nodes and make categorizations. The software was also helpful as it was used to efficiently store data, organize data, manage data, and reconfigure data to enable analytic reflection [37].

4. Findings and discussion

This section presents the perspectives of the interviewed experts in relation to the methods used in appraising feeder road construction, rehabilitation, and maintenance in Ghana. These models include economic benefits to users, the scale of impact of the project, the geographical area under consideration, political considerations, internal rate of returns of the project, and the social benefit of the project. The findings on the road appraisal models used were compared with models reviewed in literature for similarities and differences for evaluation. Analysis and discussions further consider the propensity of the models to address the components of rural transport, mainly, the construction of roads and promotion of vehicles or transport services to the users.

4.1. Economic benefits to users

Discussions held with key experts including engineers at the Department for Feeder Roads and the Ministry of Roads and Transport stressed that a lot of considerations go into planning and appraisal of new roads and transport projects in general. The discussion revealed that the economic benefits to users and the overall impact of the project on poverty-reduction efforts were of interest to policy makers.

Rural areas in Ghana are predominantly engaged in agriculture making rural communities the 'food basket' of the country. In view of this background, an appraisal of new roads often takes into consideration whether such projects, or existing ones to be maintained, will aid in conveying agricultural produce to nearby urban settlements or major market centers. The point here is, by enhancing mobility of foodstuff to nearby markets contribute towards a reduction in post-harvest losses, and that, farmers will be able to get good returns from their efforts. The interventions from the experts' interviews provide insight on this point made by one expert:

> In the Feeder Roads Department, our objective is to facilitate the movement of people in the rural areas involved in agricultural activities. For this reason, the roads we construct are always patronized by the rural folks. However, with regard to other benefits derived from the construction of a road, such as a boom in economic activities, it is possible that in some instances, this might not happen (DF 3)
>
> I think we consider the importance of the road to the people. By importance, we consider the socio-economic benefit the people will derive from the construction of the road. We consider if the road will lead people to market centers (DR 1).

Further, benefits to users are not the only a yardstick for how easily agricultural produce is able to move from rural to nearby urban centers, but also how it will facilitate movement of people to nearby settlements to engage in other economic activities. For instance, planners and road engineers consider if the road to be constructed will connect settlements, especially between rural and urban communities so that trade and economic exchanges can be undertaken. It is from this connection that processed and manufactured goods will also be able to reach rural areas and integrate them within the urban and regional economy.

The economic benefit of road to the user is one of the models used to appraise feeder roads in Ghana. The models according to the findings give priority to agriculture production areas. That is to say that road is preferably constructed, rehabilitated and maintained to promote

economic development in the food production areas. This type of appraisal model is one of the oldest used in Ghana and it is best captured as Consumer Surplus approach and Producer Surplus approach. According to Witkiss et al. [32], this appraisal model is based on the concept that high transport costs affect produce cost, and has consequence on production yield and subsequent profits.

The economic benefit to user appraisal model has some element of the cost-benefit model. That is, economic benefit is derived from the road that is constructed at a cost. However, a point of deviation from the cost-benefit model has to do with the focus on the direct benefits of the road to society or the rural community [20, 21, 22, 23] by identifying, converting into monetory terms, and calculating the conceivable gain/ loss of a proposed road construction and comparing it with the community benefits that will be derived from construction of the road and to decide if the proposed road is necessary. Somewhat, this appraisal model embraces aspects of the Road Economic Decision (RED) appraisal model, specifically, by making economic evaluation of low volume roads, and by capturing the economic benefits of roads [22, 24].

4.2. The scale of impact of the project

Another important issue that emerged during consultation with stakeholders on appraisal of roads was the scale of the impact of the project. In essence, how many people are the road project going to impact? Again, is the road going to serve just a few communities or a lot of communities? Thus, in this respect, engineers are interested in the returns of the investment and the wider impact that it is going to have. On assessment of impact, one engineer interviewed opined that they also look at the impact on the sector,

> For instance, is investment in a new road project going to increase output of cocoa production which is, inevitably, a major economic sector in the country? (RDF 1)

Furthermore, the Government may want to increase productivity in a new species of maize, tomatoes or any other agricultural produce. As part of its strategic plan, the Government may improve road infrastructure in rural areas. The expectation here is that the new road will have a positive impact on the targeted agricultural output. Yet other critical considerations are the quantum of the population the road will serve as well as whether the road will help people in accessing schools and health centers and the condition of the road itself.

Unlike the economic benefit of user models, the scale of impact model analyses roads is based on its socio-economic impact on the rural population. That is, how the road aids the rural population to access healthcare centers, educational centers, markets, and farms. This model can be classified under the economic analysis and prioritization of rural roads models [26], and shares more socio-economic analytical similarities with the Rural Access Index model because it gives priority to addressing rural isolation and focuses on the need for access and mobility in reducing poverty and promoting good healthcare and socio-economic well-being in socio-economic deprived communities. This model like the economic benefits to user model does not attach much significance to efforts that promote mobility such as making available vehicles that are reliable, suitable, and efficient. In view of the gap in the model to focus on transport services, its application in use to analyze the socio-economic impact on rural roads is a defeated one.

4.3. Internal Rate of Return (IRR)

According to experts, another method adopted in the appraisal of feeder roads is the Internal Rate of Return (IRR) method. With this method, data are gathered on activities on the road prior to its construction or renovation. This information is then compared with data collected after the road construction or the works made on the road, to assess whether there had been changes in terms of volume of agricultural produce. When there appears to be an increase in agricultural output following the construction or renovation works made on the road, then conclusions can be drawn, whether the investment made on the road has yielded positive returns. Further positive impact of the project can be gauged against changes in lifestyle and general wellbeing of the population. For instance, it would be evident how the improved accessibility had enabled access to modern technology such as mobile phones, electrical gadgets and other modern forms of living.

The quote below provides insight into this matter:

> In a summary, the Internal Rate of Return (IRR) is used to look at the situation before the road was constructed and then after its construction. The effect could be determined, for instance, from the increased output of food crops from the rural areas and any resultant impact on the lifestyle of the beneficiaries, as reflected in commercial or economic activities in the area (ING 2).

The IRR model according to the findings requires that data are gathered on activities on the road prior to construction or renovation and later compared with data collected after the road had been constructed or renovated. Such data is used to assess whether there have been changes in socio-economic activities on the road. However, in assessment of socio-economic change in activities, transportation which is a major casualty is not considered. The IRR model shares similar aspects of the CBA model since both conduct ‘ex-ante’ and ‘ex-post’ analysis [23] and compare the feedback.

4.4. The type of geographical area

Experts interviewed also indicated that in their appraisal of feeder roads and rural transport infrastructure, they do consider the geography of the area. Geography here

connotes the social and the physical geography of the area. For instance, one expert commenting on the social geography aspect of the appraisal indicates that communities varied in their use of transport facilities and services. According to an expert, in the northern part of the country, for example, both motorized and non-motorized transports are used on the same feeder roads. In such circumstances, the feeder roads in those communities are smaller, about 3 meters wide. This is to reduce the speed of motorized vehicles in order to prevent accidents between motorists and users of non-motorized transports. However, in the southern part of the country, where the use of non-motorized transport is minimal, roads are about six meters wide.

The physical geographical aspect of the appraisal process entails consideration of the topography of the area. The nature of the landscape influences the design of the road, which in turn, affects the overall cost of the road. For instance, in mountainous areas, a lot of civil engineering works need to be carried out, including leveling at some points. This definitely requires more logistic and human resources to undertake the project. The operations need to be gauged against other appraisal methods such as the impact of the project on the economy. Further, the nature of the land and surface water or drainage systems will also determine whether bridges need to be constructed at some portions of the road.

4.5. Political considerations

While a number of the appraisal methods consider the economic impact and the Cost Benefit Analysis of the intended project, experts also indicated that, the appraisal process is not entirely technical. Political factors also influence decision-making. Political considerations emanate from politicians who wield significant influence when it comes to decision-making about physical infrastructure. For instance, roads may be constructed in a rural community not on the basis of rigorous and objective Cost Benefit Analysis, but behind this may be to assuage agitations in communities against the government for neglecting them. This is common when members of the community are ardent supporters of a ruling government. Again, roads may be constructed as a way of luring community members to vote for the government in power. The observation by one of the experts provides insight into the problem:

> Now, selection of roads is not even done by the technical men here. It is done by the politicians. They bring their list and they ask you to go and carry out your studies. The engineers have a bit of influence on the decision that which road to construct but most often some of the lists come from the politicians (ING 5).

As revealed, appraisal of roads is sometimes undertaken based on political considerations. Political appraisal of roads might be necessitated by agitations from the people to address concerns in the community or based on political strategy of political party in government to win electoral votes. Whatever the motivating factor, roads have socio-economic significance. However, when political consideration is the central factor it appears to be biased because communities without political affiliations may suffer not getting roads constructed, rehabilitated or maintained. Political motivated model, like the other models, do not embody the full component of rural transport. In view that roads may be constructed yet the required vehicles to ply on the road may not be available making mobility a challenge in the corresponding communities. Again, such roads constructed may suffer periodic maintenance when power change hands. Appropriately road appraisal models should be devoid of politics, and a more appropriate model to address rural transport issues and to promote development should be environmentally friendly.

4.6. Social benefit factors

Key respondents in the interview process also indicated that the appraisal methods adopted in the context of Ghana transcend economic and Cost Benefit Analysis and include social dimension or social benefits of the project. For instance, the road infrastructural project will enhance social living and access to social services such as schools, hospitals and connect people for other forms of social interaction. Access to health care services is very important for most rural inhabitants since in special circumstances they have to fall on larger urban settlements for specialized health services. This becomes possible only if there is easy and safer means of transporting the sick and those in special needs. One engineer interviewed at the Department of Feeder Roads corroborated the phenomenon thus:

> Currently all the roads are presumed to be existent. At the Department of Feeder Roads, we do not do only economic appraisal. We use the Multi-factor Approach because it is always the fact that feeder roads provide social services in terms of access to a community and also access to economic center. Most of the feeder roads constructed is expected to improve the areas where they are constructed in terms of in social amenities (ING 3).

The use of the economic user models are biased towards rural communities which are not agriculture production areas. More so, compared with the Integrated Rural Accessibility Planning model (26), this model focuses solely on road infrastructure without equal priority to vehicular availability to harness transport services. This economic user model is established also on the premise that transport services will emerge once the road is constructed. Empirically, there is evidence to support such assertion that transport services have developed as roads were constructed (38). On the contrary, there is also empirical evidence that most of these conventional transport services face a number of challenges that makes them unreliable

[39]. Hence, there is the need for appraisal models to capture the full components of rural transport.

5. Conclusions

Globally, rural roads are an important part of socio-economic development. Investment in rural roads represents the pillar of growth of developing countries particularly in Africa and Asia and makes it possible for rural communities to access social services.

A number of models were found to be used for feeder road appraisals. Such appraisal models include the economic benefit of the road to users, the scale of impact of the road project, internal rate of returns on the road, geographical area considerations, political considerations, and social benefit factor of the road.

It was also found that feeder road construction, rehabilitation and maintenance are a priority to government. In the design of roads, the type of vehicles that are envisaged to use the road is factored by experts. However, issues of transportation are left to the rural people. It is important to note that for road transport to be provided, the government in Ghana, acting through the Ministry of Roads and Highways, and the Department of Feeder Roads must focus on road appraisal models that seek to address transport needs of the people in the rural communities.

A suitable appraisal model must have the ability to address the concerns of key stakeholders in relation to rural road transport. Mainly, the Department of Feeder Roads and the rural people. The Department of Feeder Roads is made up of civil servants most of whom are expert engineers who are in charge of advising the government on policy decisions on feeder roads, designing feeder roads, appraising feeder roads, and supervising the construction and maintenance of feeder roads from the districts level to the regional and the national levels. The rural people are mainly the beneficiaries of rural road and transport investments. Other stakeholders are various foreign agencies, institutions and donor countries who support rural development or rural modernization by providing grants or loans to the Government of Ghana in support of rural infrastructure developmental projects.

The study highlights the fact that road appraisal models which constitute the mechanisms by which transport projects are assessed can play significant role in the design and implementation of road transport projects. It is important for governments to effectively utilize relevant models as road projects need to not only ease congestion but also have positive impact on the environment. Road projects can have significant positive impact on the people if it considers the environment, improves safety, supports sustainable economic growth, provides equal access and integrates all transport networks.

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