Re-Defining “Project Impact”:
Incorporating Social Considerations Into
The Rural Road Prioritization Process

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RE-DEFINING “PROJECT IMPACT”:
INCORPORATING SOCIAL CONSIDERATIONS INTO THE RURAL ROAD PRIORITIZATION PROCESS

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ABSTRACT
Year-round reliable rural roads are a critical component of social and economic development, particularly in developing countries. Currently, road planning and the prioritization of investment decisions are based upon cost-benefit analysis (CBA) which is highly dependent on technical and economic analysis, but largely excludes social considerations. In rural areas, this frequently omits the most vulnerable, impoverished communities that have the most to gain from road access but may show a low rate return using current prioritization processes. This research focuses on augmenting the current CBA for rural road prioritization by broadening the analysis to include a robust social impact indicator that is designed to be streamlined into current prioritization processes. By expanding the definition of ‘project impact’ to account for social impacts, infrastructure investments can reduce both physical and developmental deficits. While infrastructure is not a turnkey to social development, funding aimed at lessening the infrastructure deficit in developing countries may, according to research findings, be able to improve social development indicators through more robust and holistic approach to planning.

KEYWORDS
Rural roads, developing countries, Africa, prioritization, social impact

INTRODUCTION
Globally, roads are recognized as a critical component of social and economic development. They are foundational for the operation and growth of a country, from economic activity to social concerns such as access and mobility, to needs for defense and political participation. Particularly in developing countries in regions including Africa, there is a focus on improving and expanding road infrastructure. This is seen in the planning and implementation of several major investment projects to enhance infrastructure development which lags far behind the rest of the world (Sofreco, 2011). In 2008 only about 25% of sub-Saharan Africa’s primary roads were paved, compared to a global rate of 50% (Gwilliam et al 2008). In terms of the unpaved roads, which are the majority of the roads on the continent, more than 80% of unpaved roads are considered to be only in fair condition and 85% of rural feeder roads in poor condition and cannot be used during the wet season. In Ethiopia, 70% of the population has no access to all-weather roads (Mutume 2002).

These same developing countries see deficits in development indicators as well as infrastructure: maternal and infant mortality³ rates in sub-Saharan Africa are 500 and 108 per 1,000 live births, respectively. In developed countries⁴, the rates are 13 and 6 per 1,000 live

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³ “Infant mortality” refers to the Under-5 rate of mortality for live births. See “Data” 2013 for more information
⁴ OECD and non-OECD developed countries as defined by the World Bank based on income levels
births, respectively. In terms of access to improved sanitation facilities, only 31% of the population of sub-Saharan Africa has access while 99% of developed country population has access. In terms of completion of primary school, sub-Saharan Africa has a rate of 70% while developed countries have a rate of 100% (“Data” the World Bank 2013). While infrastructure is not a turnkey to social development, funding aimed at lessening the infrastructure deficit in developing countries may, according to research findings, be able to improve social development indicators through more robust and holistic approach to planning. This paper focuses on a first-step towards accounting for the broader social impact of road infrastructure in developing countries.

The majority of roads that will exist in Africa in 2100 do not exist now (Arndt et al 2012). This highlights both a need and opportunity to ensure the resources for road construction and maintenance are utilized to most fully benefit the populations they serve. Currently, road planning and prioritization of investment decisions are based upon cost-benefit analysis (CBA) which is highly dependent on technical and economic analysis, but largely excludes social considerations (Lebo and Schelling 2001; Howe 2003; Hine 2000; “HDM-4”, World Bank 2008).

Research shows that the presence of rural roads have non-economic impacts including positively impacting progress towards goals such as reducing poverty, increasing access to health centers and schools, expansion of agricultural and non-farm economic activities, increasing political participation, access to information, and can play a role in reducing the traditional taboos that engender discrimination of women and minority groups. Although individual transportation departments may add different elements to the prioritization process, the core elements used are predominantly financial and technical. Based upon extensive literature review and the authors’ experience, a social impact analysis framework (called the social impact score “SIS”) was developed. The SIS is designed to fill four main functions:

1. At the highest level, it can be easily incorporated into the decision-making process to prioritize investments in areas with higher rates of poverty and lower road density, leading to potential substantial benefits in social impact and development areas;

2. Help policy makers identify areas where greater research may be needed and/or key areas for further in-depth research to include local priorities, enhance local capacity, and identify specific vulnerabilities that may be contributing to an under-developed transport network relative to the country/region;

3. Provide information and preliminary analysis for incorporating technology options including labour-based employment (LBE) techniques, which highlight the potential for local capacity building, employment generation, and reinvesting infrastructure funding directly back into the local economy;

4. By creating a usable metric that is rooted in development literature, highlighting the importance of road infrastructure beyond the traditional economic approach, the SIS will serve as a tool to enhance awareness at the policy level of the importance of holistic transport planning, particularly in terms of rural infrastructure.
This paper advocates the use of SIS as a routine part of the decision-making process for prioritizing investments in rural and tertiary roads in developing countries to capture a more holistic picture of the important role roads can play in development; primarily focusing on functions 1 and 4 above. A comparison with current (generalized) road prioritization practice is given to show the ability of the SIS to be incorporated into current processes without requiring extensive overhaul of existing approaches.

BACKGROUND

The social impact of rural and tertiary road infrastructure has been well documented in various case studies and development literature completed by development agencies, governments, and consulting groups in many developing countries. While local culture, government policy and capacity, environment, and other factors vary between areas and affect the impact roads have, there are consistent findings across the literature. Notably, these impacts include increased access to healthcare and clinics, greater access to knowledge of markets, information, credit, and political participation and awareness, reduction in poverty, and a decrease in discrimination against women and girls (African Union, 2005; Lombard and Coetzer, 2006; IRF Bulletin, 2008; Gachassin, et al. 2010; Brycenson et al 2006).

A chart (Table 1) from (Edmonds, 1998; modified by author) details how several dimensions of poverty are impacted by access and transportation. Each of these ten areas is a component of rural development, and shows the diverse impact that roads and reliable access to these components can have.

<table>
<thead>
<tr>
<th>Category</th>
<th>Selected Contributing Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>Physical access to job locations; lack of transport services; lack of job opportunities</td>
</tr>
<tr>
<td>Land</td>
<td>Distance and time to fields</td>
</tr>
<tr>
<td>Information</td>
<td>No radio; no telephone; poor postal services</td>
</tr>
<tr>
<td>Credit</td>
<td>Location (time/distance) of credit facilities</td>
</tr>
<tr>
<td>Health Services</td>
<td>Lack of health centres; poor access; lack of transport services; limited personnel; lack of medicines</td>
</tr>
<tr>
<td>Water</td>
<td>Lack of irrigation; distance to supply; lack of wells</td>
</tr>
<tr>
<td>Energy</td>
<td>Limited electricity; decreasing supply of wood; distance to source</td>
</tr>
<tr>
<td>Markets</td>
<td>Poor transport facilities; location</td>
</tr>
<tr>
<td>Transport</td>
<td>Poor tracks; poor transport facilities; lack of roads; limited number of vehicles</td>
</tr>
<tr>
<td>Education</td>
<td>Poor tracks; lack of transport facilities; lack of teachers; limited materials</td>
</tr>
</tbody>
</table>

Limited access to markets and economic centers is a field of great study, especially in terms of agricultural development and factors such as transportation cost and time to market for sensitive agricultural goods. However, the broader goals of socio-economic development are often rooted in the basic services and must be considered an important part of the overall growth and development equation. Lombard and Coetzer, 2006, cite that socio-economic development is
a precursor to economic growth, and is hampered by several factors including a lack of adequate road infrastructure. The “unreliable and difficult access” that characterizes much of the African (and other developing countries’) road infrastructure can “reduce growth opportunities and negate benefits from investments in other sectors [which are] designed to improve the livelihoods of poor communities” (IRF Bulletin, 2008). In this view, it is clear that reliable rural roads are important in areas far beyond the direct economic impact, and perhaps can even be described as the building block upon which many components necessary for economic growth lie. For example:

“A study in Bangladesh compared two sets of [129] villages showed that villages with road access, compared with villages without access, fared much better in farm-gate price of produce, fertilizer use, land under irrigation, household income, income per acre of field crops, wage income of landless labor, and percentage of employed women…improved rural access provides social benefits in promoting education, particularly girls, health benefits, increased labor mobility, the spread of information and knowledge and improved access to markets. Many studies demonstrate the dynamic changes that improved rural mobility brings to the social and economic life of rural areas” (Lebo and Schelling, 2001)

Additionally, components such as social infrastructure are highly important for accessing and participating in things like credit, political participation, and growth and strengthening of community organizations (Satish, 2007; Edmonds, 1998). The sheer amount of time spent in completing daily household activities is a limiting factor in the creation and implementation of community organizations, school attendance, and other secondary needs. Rural roads are one way to lessen the transportation burden on rural households (Edmonds, 1998; Ministry of Rural Development, Cambodia 2007).

Not all impacts of road provision are positive: rural areas with higher road densities often see higher prevalence of HIV/AIDS in roadside communities and higher rates of pedestrian/motor vehicle accidents. Environmental degradation is another area of potentially negative impact from road construction and use (African Union 2005; Lebo and Schelling 2001; Satish 2007; Paige-Green et al 2004; Mozambique FRP; Bradbury 2006). While the spread of HIV/AIDS and other diseases and treatment for injuries caused by accidents may be mitigated by benefits from increased healthcare access, road construction projects should account and plan for negative impacts before construction is undertaken. These concerns fall outside the scope of the SIS because they are project-specific studies that are undertaken once certain road projects have been identified as priorities.

More generally, NGO respondents was the high cost that poor road infrastructure contributes to overall project cost. Costs that are incorporated include the wear and tear on vehicles and the staff time being spent on travel. The ‘productive time’ wasted on transportation was identified by all respondents (health and non-health related NGOs) as the greatest potential positive impact if rural roads were greater in number and quality (“Surveys” 2012).

**Specific Impacts: A Focus on Education and Healthcare**

Despite the trend of increasing urbanization in the developing world, in 2000 over 60% of persons in Africa still lived in rural areas; while this number is expected to decline, by 2030 approximately half of the population of Africa will still be living in rural areas (Kumar and
This is important because poverty is often worse in rural areas for a myriad of reasons, but relating in large measure to a lack of access to services, representation at the political level, access to credit, access to information, availability and access to healthcare, education, and markets. Many of these issues are impacted by provision of more or better road access (African Union, 2005; Lombard and Coetzer, 2006; IRF Bulletin, 2008; Gachassin, et al. 2010; Bryceson et al 2006).

In surveys conducted by the author in South Africa in 2012, several similar responses were given: poor roads affect all areas of development, including healthcare, economic growth, education, empowerment (of vulnerable groups), and poverty. In the absence of more clinics and health facilities built, funded, and adequately staffed, they stated that improvement in rural road infrastructure is a crucial component to increasing rural health:

“[Due to poor roads] people are restricted in their access to essential services, and it further presents a barrier to the service implementers being able to reach them. For instance, clinics serve very wide areas and people are required to travel large distances to reach them. In order to support the communities, however, mobile clinics are supposed to visit each [local] clinic. These large vehicles [mobile clinics] rely on adequate roads” (“Surveys” 2012).

In a survey of rural roads and poverty reduction in Africa and South Asia repeatedly find that rural roads have high value in part due to access to medical centers (Bradbury et al 2006). This was largely attributed to the high opportunity cost of ease of travel associated with pregnant or acutely ill persons.

In relation to healthcare, the ability to provide vaccines and other medications is often reliant upon the ability to keep the ‘cold chain’ – the ability to refrigerate and control the temperature at which medications are transported and stored. Roads are a key element of this, because of refrigerated transportation and the prevalence of other infrastructure including electricity at on-site clinics. Roads do not present the only barrier to healthcare provision or use (Ensor and Cooper, 2004), and there are creative examples where these constraints are overcome (see: Parsons, 2009) but where healthcare goals are of particular consideration among local or national infrastructure planners, the specific needs of rural areas should be identified through research conducted in focused community participation groups as well as NGO input to determine the most meaningful types of interventions.

Paired with findings on health benefits, impacts on education are the most widely touted positive non-direct impacts of improved rural road infrastructure (Lebo and Schelling, 2001; African Union, 2005; Fuglestvedt et al, 2007; Bryceson et al, 2006). Most evidence is from locational case studies, but the impacts are recognized at the global level: The MDGs highlight the need for rural roads in their indicators including the distance to primary schools and other metrics (African Union, 2005).

Education is identified as the dominant reason for travel for non-economic purposes (Bryceson et al, 2006). A study in Ghana showed that distance and difficulty of travel to primary schools was an important consideration in attendance, but was inhibited largely not by the availability of primary schools, but the distance and difficulty of travel to secondary schools; where secondary schools were deemed inaccessible, primary school enrollment decreased (even
when it was accessible) because it was perceived to provide little benefit in the longer term. Findings in Vietnam and Lesotho similarly identify gains in education beyond the primary level where road investments were made.

There are two main components of the impact rural road infrastructure has on improving education in rural areas. The first is the improved ability of students to get to schools, mainly due to lower travel times both for travel to and from school and due to lower transportation time for other needs (Fouracre, 2001; African Union, 2005). The second is the availability of more and higher quality teachers. This is linked to provision of road infrastructure for many indirect reasons, including the higher quality of life offered by areas with better access to services (such as healthcare and businesses) (Howe, 2003; Bryceson et al, 2006; Van de Walle 2002; Kocks Ingenieure, 2008).

A study of Morocco concluded that the presence of a paved road in a rural community more than doubled the attendance rate of girls at school (from 21% to 48%), and attendance by boys increased from 58% to 76% (African Union, 2005; Howe, 2003). The contribution of roads was multi-faceted, including paved roads requiring fewer closures (reducing teacher and student absenteeism), easier teacher recruitment, and greater availability of supplies. This was in conjunction with an increased investment in school staffing in the areas being served by the paved road investments.

In Sub-Saharan Africa, one study showed that the probability of a child being enrolled by primary school was increased by approximately 20-50% if a primary and secondary school were located within the community. In Lesotho, the social value (including education) of road upgrading is identified as much higher in remote mountainous areas (African Union, 2005). In Cambodia, evidence shows ‘substantial links’ between the development of rural roads and increases in enrollment rates for both boys and girls, due to improved school accessibility (Ministry of Rural Development, 2012). In Vietnam, the links between poverty, poor infrastructure, and lower rates of attendance mainly impacted the enrollment and completion of secondary education (African Union, 2005).

Regarding gender, there are several case studies which cite that the improvement in attendance was gender neutral (Cote d’Ivoire, Lesotho and others). In many others, specifically where enrollment rates among girls began at a lower rate than boys, there was a substantial increase in female enrollment when improvements in rural infrastructure were seen (Ghana, Morocco, Bangladesh, Bhutan). This may due to several factors, including lower transport time for school and other activities as well as increased safety in school travel for girls (African Union, 2005; Howe, 2003; Ministry of Rural Development, 2012; Bryceson et al, 2006; Van de Walle 2002; Kocks Ingenieure, 2008; Fouracre, 2001).

In summary, the benefits to increased school enrollment rates have been identified through increases in attendance at the primary level and higher rates of completion for students at the secondary and tertiary levels. The main reasons for this include better recruitment of teachers and lower levels of absenteeism by teachers, the availability of supplies (both school-related and other including water) and less time spent on other basic activities necessary for household survival. It is important to note that other factors such as cultural constraints, availability and location of schools, and quality of education are other factors that may contribute to low enrollment factors (Van de Walle 2002).
METHOD

Approach for Developing SIS

In most developing countries, road infrastructure is one component of the overall development picture and competes with limited resources for construction, maintenance, and rehabilitation of the network (Dabla-Norris et al. 2010). Because there is a limited budget available for the needed investments, road projects must be prioritized. Traditionally, this is done by an economic CBA, but in many cases, most rural roads fail to meet the economic internal rate of return. Conversely, these rural and tertiary roads usually represent the highest cost for potential climate change impact and potential for positive social benefits (Van de Walle 2002; Howe, 2003; "Surveys" 2012; Donnges, 1998; Lebo and Schelling, 2001).

The social impact analysis approach in this paper focuses on non-economic aspects and provides a quantitative (not economic) output. This is for three reasons: firstly, most road agencies have an established process for road funding allocation that is largely based on economic justification. The purpose of SIS is to augment and broaden the decision criteria, and therefore, direct economic analysis of roads is not considered in the metric. Secondly, in most cases, the economic return of roads is lowest in areas which serve to benefit the most in social impact from road construction. Therefore, a separate and distinct metric is utilized to capture this difference and highlight the potential broader impacts roads can have. Third, much of the reason social impact is not considered as a routine part of the CBA for road investment decisions is the difficulty in quantifying economically the social impacts. By creating a quantitative, but non-economic output, the need to justify specific economic values as they correlate to specific aspects of social impact has been eliminated. Consequently, this also means that it is only an effective metric when used to prioritize multiple road investment options. However, since most developing countries have an overwhelming need relative to available funds, the current state of practice at the policy level focuses on prioritization. The non-economic quantified output is thus accepted as a limitation because it does not inhibit its use in most situations.

SIS Components

Based upon common findings in the literature reviews and field experience, a multi-criteria decision analysis (MCDA) method was used to create the SIS framework (Marcharis et al. 2009). SIS produces a single “score” for social impact (the higher the score, the greater the positive social impact) which can be utilized as a component for road prioritization. The SIS framework is composed of four indicators, briefly described below. For a full explanation of the indicators, relevant literature, and additional information, please see Schweikert 2013.

Indicators

The four indicators that combine to produce the SIS metric are:

1. Rural Mobility
2. Rural Access
3. Urban Access and Mobility
4. Employment

Each of these indicators is briefly explained below.
Rural Mobility:

The rural mobility indicator is a measurement of the rural population with new or improved access to an all-season road. The potential impact of the increased proximity to a new, reliable road is increasing mobility to utilize social infrastructure, markets, information, and other components inhibited by isolation.

There are four components that combine to produce the Rural Mobility indicator:

1. Population impacted by road (new)
2. Population impacted by road (additional road)
3. Population poverty level
4. Motorized vehicle ownership

Rural Access

The rural access component indirectly estimates the potential social development impact through access to services that may be enhanced by new road access. The services measured in this indicator are primary schools, health centers, and non-governmental organization presence or dedicated work projects within the affected area of 5 km² within either side of the road. The rural access indicator gives higher scores to areas where the density of primary schools and/or NGO project work is higher and high scores to areas where there is limited healthcare access and density because roads are likely to improve access and utilization by reducing the transportation burden.

This indicator biases road investment towards areas where services already exist. The existence of roads can serve to promote investment through greater accessibility, lower transportation costs, and greater development. If road projects are being considered in conjunction with other investments in rural services, this component may be more useful if not included in the SIS calculation. Additionally, where NGO presence exists, a consultation with local staff to determine needs and additional considerations should be an important component of the road planning and investment process.

Urban Access and Mobility

While the focus of this paper is rural road infrastructure, a road under consideration may include a portion of length that travels through an urban center. When this is the case, an urban access and mobility indicator can be used to differentiate potential benefits and impacts between options. This indicator should only be used where all road options under consideration include an urban portion; otherwise the SIS will be skewed towards the road options that include urban portions because the SIS metric is built to be an additive framework where each component is scored then added together to determine the SIS. As an alternative option, when multiple options are being considered with both roads that include and do not include urban segments, the urban access and mobility indicator can be used separately from the SIS metric and other indicators to provide guidance on potential benefits between the road options that consider urban segments.

The motivation behind providing this indicator is to bring awareness and basic analysis for non-rural roads. Based upon a few case studies, notably the “Stuck in Traffic” Report produced in 2008 by the AICD group at the World Bank (Kumar and Barrett, 2008), increases in urban road density can decrease travel time, congestion, and potentially increase access to public transport and contribute to pedestrian and non-motorized transport safety. These impacts can
lead to a better quality of life, lower opportunity cost of moving people and goods between urban areas and increased public and private mass transit options. When urban roads are being considered, the inclusion of sidewalks is especially important for ensuring benefits to the urban poor; walking, bicycling, and other means of non-motorized transport can be heavily utilized and often pose safety hazards where there is non-existent or non-enforced dedicated pedestrian walkways.

**Employment Potential**

Under the right conditions, the opportunity for employment generation by the construction of new rural roads is considerable. When training, institutional support, and other necessary factors exist, labour-based construction techniques can produce results similar to machine-intensive (traditional) road construction with less pollution, greater employment including disadvantaged populations, and cost a similar amount with a higher percentage of the costs of construction being reinvested into the local economy through the wages of local workers.

This indicator serves to capture the potential benefit to local persons in the form of short-term employment, skills transfer, increased knowledge and awareness of social concerns including health and HIV/AIDS, and increased ability to maintain the road when severe events occur and/or the local road authority is unable to immediately address road maintenance issues. Additionally, this indicator measures the potential amount of road construction costs that are directly reinvested into the local economy. This is contrasted with traditional, non-labour based construction (machine-intensive) where generally a higher proportion of the costs that is paid to contractors living outside the immediate impact area of the road.

For this indicator, LBE must utilize local labour living within the 5 km proximity of the road, and must include a plan to hire a percentage of disadvantaged populations including women. Different studies suggest different numbers, but at least 25-30% of the total LBE labour-force should be women. For the multiplier, the input includes whether or not a health and HIV/AIDS training will be included. This should last for at least one full day and be created and implemented in conjunction with the health authority and/or local NGOs that work in the area and provide health services.

Additionally, the LBE output is slightly different. Alongside the SIS score, the Employment Potential indicator will yield two measurements for comparison: a labour-based and non-labour based total wages reinvested into local economy total amount and the amount of person days of employment generated due to LBE techniques. This is simply for planning and comparison purposes and the difficulty of comparing metrics across different options.

**PROPOSED IMPLEMENTATION OF SIS INTO CURRENT PRACTICE**

**Decision Process**

CBA is the conventional method for prioritizing road investments. Formula 1 shows a general approach to prioritizing projects based on rate of return.

$$PR = \frac{PI}{PC}$$
Where:
PR = Project Return
PI = Project Impact
PC = Project Cost

*Formula 1: Rate of Return for Project Prioritization*

The “project impact” (PI) element measures the impact of the project. While individual agencies may include additional components in the analysis, generally the PI focus in current practice is on technical and economic considerations. Figures 1 and 2 both depict the process for determining “Project Impact” in current and proposed processes. The purpose of the proposed process and incorporation of SIS is to broaden the meaning of ‘impact’ by acknowledging and considering the larger role roads play in development and growth.

**Current Practice and Proposed SIS Implementation**

Figure 1 depicts a simplified but typical decision process in many national and state road agencies. Projects are prioritized based on a two-step selection process. First, all possible projects are prioritized based on technical and basic economic considerations. From this step, projects that are of higher priority (Group “A”) are further prioritized based upon economic and ‘socio-economic’ considerations. In many cases, ‘socio-economic’ considerations are simply poverty rates and population within an impact range of the road. To differentiate the limited scope of social analysis in current practice, the term “poverty rates” is used in Figure 1.
There are two areas where the social impact analysis can be improved (see figure 2). Firstly, a more detailed social impact analysis can be undertaken using the SIS framework. This will provide a more robust analysis that captures more broadly the impacts a road may have on education, health care, gender issues, and more. Secondly, the two-step process used in Figure 1 is likely to eliminate many roads that have a high social impact but a low economic and/or technical value. By being prioritized into the “B” group of projects, those that may see benefits primarily in areas such as agriculture, tourism, and social impacts are never considered in the final decision process.

In contrast, Figure 2 shows how a more even process can be utilized to represent a more balanced and holistic approach. Using the proposed process, roads which may confer significant social benefits but show a low rate of return for economic considerations are given a chance for consideration alongside roads which will traditionally be prioritized based on a high economic rate of return.

Implementing the social impact considerations into the current decision process does not require an overhaul in the way decisions are made; rather it can be streamlined into the current process. The social impact score would replace the current ‘socio-economic’ factors (‘poverty
rates’) that are considered in Figure 1. The process proposed in Figure 2 maintains a similar analysis technique, but provides greater detail and scope for prioritization, increasing the transparency and robustness of the metric for social considerations. By using the proposed approach and expanding the scope of analysis for road prioritization and valuation, road agencies can expand the definition of impact and see a more balanced, and potentially greater, project impact for roads.

**Limitations and Further Research**

There are inherent difficulties in quantifying social impacts; as stated in Fouracre, 2001, the overriding challenge is that, “no hard and fast distinctions can always be drawn between the social benefits and the economic… often these two areas go together because an improved economy is likely to benefit a community in social terms while social benefits such as cleaner water or basic access to healthcare leads to economic benefits by lowering mortality and illness, increasing productivity (paraphrase)”. Another challenge is that impacts may vary between different geographic regions and within regions based on socio-economic factors, cultural factors, and institutional factors, among others (Van de Walle 2002; Duncan, 2007; Howe, 2003; Fox and Porca, 2001; Satish 2007).

Another limitation is due to the aim of the SIS metric: to be utilized by decision makers in developing countries. Because this places constraints on the data that is available and the resources available for analysis, the SIS does not account for local consultation, unique concerns at the village level, and uses a simplified approach to estimate social impact. Several of the metrics have an inherent assumption, such as (for the rural access indicator) that the density of health facilities will create a positive change in the community. There is ample evidence that building or improving a road in a rural area where transportation burden is a barrier to use of health facilities will improve their access and utilization. However, where cultural constraints, failures in policy, or other barriers exist, the road cannot be considered a turnkey solution to significantly improving health issues within an area.

The SIS is an attempt to quantify the benefits discussed above because, as stated in Van de Walle, 2002, “it is arguably better to directly confront this problem, and set explicit ‘best guess’ estimates rather than putting important classes of development projects outside the evaluation system, such that we have little or no idea if we are investing too much or too little in these types of projects.”

Further research can focus on validating the SIS ranges used for scoring and potential correlations between different indicators being used (for example, if a location scores high on the rural access indicator, is there a correlation to high or low scoring on the rural mobility indicator?).

Ongoing research into understanding the cross-boundary nature of poverty and development can serve to improve the findings derived from existing case studies. Ideally, this will serve to broaden the traditional sector-specific approach to poverty alleviation and development, progressing towards more holistic and robust development interventions.
Conclusion

The purpose of the SIS metric is to create a metric that enhances the decision-making capabilities of policy makers in developing countries in terms of rural road investment prioritization. By broadening the definition and scope of “project impact”, road agencies can enhance their effectiveness of funding road projects by incorporating social impacts into the decision process at an early and meaningful stage of the process. The focus of the enhanced capabilities is the inclusion of social impact factors in the decision process. Currently, most rural road prioritization focuses on economic return and BCA, yet evidence cites that the main benefits of many rural roads are not captured in this analysis and instead stem from increased access and mobility allowing for greater utilization of healthcare services, education, access to markets, and greater NGO project access, among many other factors.

The SIS method does not require an overhaul of existing decision practices. It is designed for implementation into the current method of prioritization through quantitative scoring.

The SIS was designed to be one component in the overall decision process. Rural road prioritization, investment, maintenance, and sustainability requires sound technical appraisal and construction, quality ancillary works projects (bridges, culverts, curbs, etc.), and consideration of elements such as traffic, climate, and growth. However, these traditional decision components do not capture the broader role that roads may play in a community’s development, especially communities where there is a high incidence of poverty and other human welfare concerns. The focus on economic BCA can be expanded to incorporate social considerations and rural roads will, in many cases, yield higher overall returns in analysis.

This is important because when dealing with non-economic concerns, “a large share of the benefits cannot be explicitly recognized in monetary terms and therefore are not included… If the alleged social benefits are real, conventional methods are unlikely to be a reliable guide to project selection” (Van de Walle, 2002). There is a challenge to isolate the variables regarding social impact which are attributed to the road, but the SIS seeks to identify key indicators which are cited in many case studies to capture induced and indirect benefits and may aid in road planning where social considerations are important.

Lombard and Coetzer highlight the importance of rural roads in the larger picture: “rural social infrastructure such as education and health facilities is an essential source of economic growth and it is of imperative importance that accessibility and mobility be provided to such infrastructure, through the provision of continuous rural roads investment, to provide sustainable rural roads infrastructure over the long term.”

Expanding the definition of “project impact” is one step towards seizing the opportunity for roads and infrastructure management to see an even greater impact upon all strata of population. The development of a more holistic approach to technical, economic, and social spheres is targets the improvement of overall welfare and development progress.
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