ROAD PROVISION FOR POVERTY REDUCTION AND IMPROVED SERVICE DELIVERY IN RURAL SOUTH AFRICA

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ABSTRACT

Besides access to the national road network leading to major urban nodes in South Africa boasting higher order goods and opportunities, benefits of rural roads include better access to local markets, educational and health facilities, employment opportunities as well as local sources of food, energy and water. Given the national imperatives to provide basic services to all South Africans, rural roads certainly represent the fulcrum of government's service delivery agenda, and for that reason, the effectiveness of service delivery (or the lack thereof) and returns on transport infrastructure investments have become the focus of national attention particularly where they grab the headlines by way of violent service delivery protests. Despite massive backlogs in terms of maintenance and provision of new infrastructure occasioned by a multiplicity of factors, least of which include narrow capacity and skills base, inadequate funding, weak integrative planning, and political will, this paper highlights the important role played by rural roads (and transport services) especially with regard to impacting the MDGs. The paper further asserts that the centrepiece of integrated planning – information – for example, about the network of rural roads, needs to be generated and fed into decision-support systems that allow transport authorities to make informed decisions about infrastructure investments given the severe constraints on funding sources. This stems from the realisation that framing rural roads as assets in their development and management as well as in terms of rural communities' productive, social, and locational assets provides impetus for and commitment to protracted action. It then gives an overview of the efforts of the Department of Transport to assist selected district municipalities to develop such decision support systems in their jurisdictions – Rural Road Asset Management Systems – with a view to heightening service delivery.

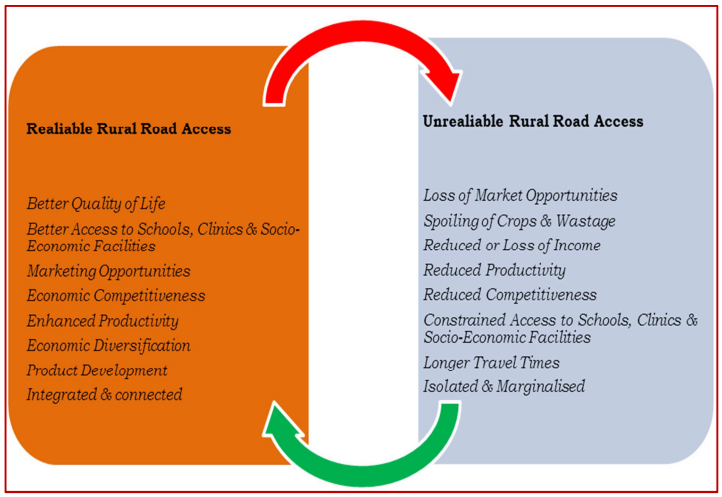
Key words: Millennium Development Goals, poverty reduction, rural road assets, capacity, institutional and organisational arrangements, service delivery

1. BACKGROUND

1.1 Transport for a pro-poor rural development agenda

Rural development, encompassing local economic and human resources development, as well as improved service delivery relating largely to health, education and welfare, is one of the key priority areas identified by the South African government. Rural development may crudely be defined as the introduction of structural changes in the rural socio-economic circumstances to achieve improved living standards for rural communities and making the process of their development self-sustaining (Mashiri et al, 2009). Investment in rural infrastructure such as transportation (also refer to Figure 1 below) is one such key structuring intervention, whose impact on livelihoods can be enhanced through an asset-based development approach, as follows:

- *Physical capital* – this involves the provision of transport infrastructure including access roads, low-level bridges, intermodal hubs, pedestrian bridges, jetties, public transport shelters and termini shelters, and paths.
- *Natural capital* – transport infrastructure construction can result in serious environmental degradation such as erosion, which necessitates mitigation measures which could be implemented through employment-intensive methods.
- *Social capital* – transport provides the main means by which individuals and communities achieve social bonding, access social infrastructure and the outside world. It provides the means of selling output (produce and labour) and provisioning community needs. Transport increases information flow which tends to influence productivity, and
- *Human capital* – transport development improves access to human assets such as health, education and employment.



Rural communities require all-weather (gravel/laterite) roads to access basic socioeconomic needs – a fundamental requirement to support governments' efforts to reduce rural poverty (Fan et al., 2005; Gourley et al, 2002; Mashiri, 2005). Figure 1 paraphrases the importance of year-round rural road access and the gravity of inadequate road provision.

(Source: Gourley et al, 2002)

1.2 Socially sustainable transport

It is germane to note here that over the years, South Africa's investment in road infrastructure has been eroded through lack of well-orchestrated and funded road maintenance regimes resulting in unreliable, and oftentimes, lack of transport infrastructure especially in rural areas, which has had a pervasive influence on poverty. Poor transportation infrastructure has led to, among others, frequent vehicle breakdowns, high vehicle maintenance costs, high fuel consumption, road accidents, high fares and charges, shortfall in the supply of transport vehicles, and reduced socioeconomic interaction in rural areas (Mashiri et al, 1998). However, given the multi-faceted causal complex of poverty, there is no doubt that interventions to reduce poverty must be planned and coordinated across sectors,

jurisdictions and groups (Mashiri et al, 2005). Thus, transport for poverty alleviation is in effect describing the notion of socially sustainable transport. Socially sustainable transport development contributes to the provision and improvement of physical assets (infrastructure and means of transport) available to a community. However, the lack of it undermines the capacity of communities, to own and productively employ their assets, e.g. the burden of transport activities such as collecting water and firewood, accessing public transport to meet subsistence needs are so time and energy consuming, that the poor lose out on opportunities to earn higher incomes and to build assets, including financial resources.

Socially sustainable transport also seeks to strengthen socio-economic linkages between rural and urban areas with a view to increasing income-earning opportunities for trade and employment, and discouraging out-migration among job-seekers, especially the youth.
Nobel Laureate, Professor Amartya Sen (2006), draws three main conclusions relating to "making infrastructure work for the poor" that:

- Small-scale, community-based infrastructure has significant, direct impact on various aspects of human poverty and security
- Local communities feel a greater sense of ownership of these small projects, and
- Small-scale projects and large-scale national or even cross-border infrastructure development are mutually reinforcing.

It is the contention of this paper that the impact of rural roads, and by extension, the effectiveness of rural development endeavors, will come to naught so long as rural transport infrastructure programs are just seen as improving the odd gravel road from rural areas and not looking at the network in totality, including community infrastructure vis-à-vis socioeconomic needs. Thus, well-appointed infrastructure investment underpinned by beneficiary-oriented programs improves productivity, promotes rural employment, positively impacts income growth and eventually irreversibly erodes poverty (Mashiri et al, 2013).
The asset-based development and management of rural roads referred to above considers linkages between households' portfolios of productive, social and location-specific access and mobility assets, the policy, institutional and risk context, their behaviour as expressed in their livelihoods strategies, and outcomes in terms of well-being. Evidently, in order to reduce rural poverty in a sustainable manner, it is imperative to have a firm handle on and understanding of, on the one hand, household and asset portfolios relating to mobility and access, and on the other, parallel municipal asset classes, with a view to unpacking how rural communities employ these and other assets to influence the selection of livelihoods strategies which, in turn, not only determine their well-being, but also dictate their station in the mainstream socioeconomic development agenda.

1.3 Purpose of the Study

This paper seeks to achieve the following objectives, namely:

- Highlight the importance of rural roads in rural development
- Underline the efficacy of an asset-based approach to rural road provision, and
- Underline the importance of decision support systems (DSS) such as rural road asset management systems for delivering optimum infrastructure investment, and
- Profile the work of DOT in funding such DSS as a powerful signal for pro-poor investment in the rural transportation sector.

1.4 Approach

The paper employs a case study approach and is based largely on a review of existing literature in the public domain and a discussion with experts, practitioners and officials in the sector.

2. LITERATURE: UNDERSTANDING THE CONTEXTUAL REALITIES

2.1 Poverty impacts of rural roads

The literature on the poverty impacts of rural roads is framed in terms of three main headline issues (explained below), namely, human capital, market access and labor activities:

- ***Human capital:*** Relates to the provision of basic needs e.g. health and education, rural roads rehabilitation, e.g., Vietnam improved primary school completion rates and enhanced the treatment of broken bones (Mu & Van de Walle, 2007). Road development in Bangladesh led to higher girls and boys schooling (Khandler et al, 2009).
- ***Market access:*** Greater availability of inputs and reduced prices due to lower transport costs, e.g., Minten & Stifel (2008) show that the crop yields for the three major staple items in Madagascar (rice, maize and cassava) are lower in isolated relative to non-isolated areas. Fan, Rao & Zhang (2004) provide a more macro example on Uganda in which shortened distances to feeder roads significantly increase agricultural labor productivity, and
- ***Labor activities:*** Relates to the creation of employment and new job opportunities, e.g., Mu & Van de Walle (2007) show that road projects in Vietnam increased employment opportunities by 11% for unskilled labor. In addition, households affected by a road project are less likely to rely on agriculture or forestry as their main source of income and often switch to the service sector.

It is germane to underline here that transport interventions and construction of new transport infrastructure can indeed exacerbate exposure to risk (Davis & Njenga, 2003; Mashiri et al, 2004; Fan et al., 2005). Increased mobility may be associated with exposure of communities to new disease through in- or out-migration. In some of the AIDS-afflicted countries, such as South Africa, the highest HIV prevalence rates are found on major transport routes and truck drivers are frequently considered a high-risk group. The essential implication of a multidimensional definition of poverty is to underline the way public actions in different sectors – e.g. health, education, agricultural extension, water, roads and the environment – are needed to address the needs of the poor *(ibid).* Transport needs must be considered in relation to other needs that are conventionally seen as belonging to other sectors if their significance to poverty and its reduction is to be understood.

2.2 Strengthening livelihoods through mobilization and building of assets

Given that agriculture cannot serve as the sole engine of rural growth, a more balanced spatial and multi-sectoral approach to rural development is needed (Ellis, 1998). This requires at the household-level (microeconomic), community-level (meso-economic) and municipal-level (macro-economic) asset development orientation toward identifying drivers of growth such as rural road assets. The asset-based approach to rural road development and management thus can support and even underpin the livelihoods approach (as propounded by Moser, 1998). In this regard, by using the asset-based livelihoods conceptual approach, drivers of sustainable rural growth and poverty reduction are

isolated and evaluated by focusing on the assets and combinations of assets needed by different types of communities and households in different geographical settings to take advantage of economic opportunities to improve their well-being over time.

2.3 Asset-based development and management of rural roads

The asset-based approach for infrastructure planning, provision and management focuses attention on the productive, social and locational assets of rural communities and municipalities, with the understanding that the quantity, quality and productivity of their portfolio of rural infrastructure assets determine the potential for long-term growth and poverty reduction (Deininger & Olinto, 2000; Deininger & Okidi, 2002). As such, these rural road assets may be considered as the *'drivers'* of sustainable growth and poverty reduction.

In addition, this approach – the asset-based development and management of rural roads can be used to explore relationships between assets, context, behaviour and outcomes (Chambers, 1997; World Bank, 1994; Deininger & Olinto, 2000; Deininger & Okidi, 2002; Pomfret, 2006; World Bank, 2009.1). These local and mainstream bundles of infrastructure assets are broadly defined to include the productive, social and locational assets that determine an opportunity set of options for livelihood strategies, which in turn, determine outcomes in terms of household and community well-being. Of pivotal importance is the context, the policy and institutional milieu and the existence and level of risks. The welfare-generating potential of rural road asset depends on the interface between the assets and the context (IADB, 2000).

2.4 Rural road asset maintenance

Long-term social and economic benefits from roads are often threatened by neglect of periodic maintenance. Rural roads, particularly gravel roads, quickly deteriorate if not regularly maintained, and benefits can be quickly lost if the roads are periodically impassable or the overall condition is bad (Gourley et al., 2002). The costs of not maintaining infrastructure, in a context in which efforts are often directed substantially at building new infrastructure, are exponential. It has been determined, for example, that 90% of Mthatha's surfaced road network has deteriorated beyond pothole repair requirements especially in the central business district (CBD) (Mashiri et al, 2013). Thus circulation (and by extension doing business) within the CBD is decidedly cumbersome, while movement through town is interminable – generating a relatively significant carbon footprint for a town of its size *(ibid).* Clearly, it is equally important to focus on maintenance streamlined by a robust rural road asset management system so that gains made in new infrastructure provision are not lost quickly owing to lack of a prudent infrastructure maintenance regime (Chakwizira & Mashiri, 2009; World Bank, 2009). Deininger & Okidi (2002) identify critical pre-conditions for successfully decentralizing asset-based development and management of rural roads, namely:

- Adequate local governance, in terms of legal, financial and community participation
- Relate the road classifications to political responsibilities – national roads to national governments, municipal roads to municipal governments etc.;
- Ensure that the mechanisms for financing are devolved with the responsibilities
- Identify and meet the technology and capacity building needs of the receiving institution; and
- Establish monitoring and physical and financial accountability systems in place (Attanaso & Szekeley, 2001)

Devolving responsibility for road maintenance to local communities, particularly for local circulation infrastructure ensures that poor households can benefit not only through direct

employment, but also by becoming active stakeholders in the provision of roads serving their area. This can be a powerful means of ensuring long-term sustainability, if supported by local ownership and the technical expertise of local authorities. The income generated from employment-intensive work on the road can also be accumulated as start-up capital to invest in other livelihood opportunities and thus move away from the clutches of poverty (Mashiri et al, 2008). This is informed by local and international experience which has demonstrated the potential of such employment-intensive public works programs to provide jobs, alleviate poverty, build capacity and create community assets. The term 'employment-intensive' is used to describe a competitive technology where optimal use is made of labour as the predominant resource in infrastructure projects, while ensuring cost-effectiveness and safeguarding quality *(ibid).*

3. DISCUSSION

3.1 Importance of rural transport infrastructure and services

As indicated elsewhere in the paper, transportation infrastructure and services are crucial for sustained socioeconomic development especially in combination with other interventions as aptly demonstrated by the sector's influence on the successful delivery of the millennium development goals (MDGs) (Mashiri, 2011).

3.1.1 MDG 01: Eradicate extreme poverty and hunger

Mobility provides opportunities for rural and urban communities to engage in socio-economic activities. Investment in improved mobility (transport) then facilitates access to employment and is itself an employer, e.g., through labor-based construction and the operation of transport services. Rural roads play a pivotal role in facilitating mobility. It is not surprising therefore to note that transport constitutes a significant component of rural / traditional agricultural product market price, e.g., in a case study in Indonesian, transport imposed between 20% and 25% to the market price of agricultural products (albeit, less than 5% to modern agricultural industry market price) (Silviani, 2000).

Table 1: Country comparisons of village trip characteristics

Country		Number of Trips		Time required		Load	
		Internal	External	Internal	External	Internal	External
1	Indonesia	84%	**16%**	44%	**54%**	21%	**79%**
2	Ghana	93%	7%	56%	44%	76%	24%
3	Zambia	91%	9%	80%	20%	81%	19%

As illustrated in Table 1 above, transport enables rural communities to access opportunities outside their village thereby widening their sources of income. In addition, the growing external trips indicate more socio-economic interaction and hence higher opportunity to add value to their travel, and by extension, strengthen their livelihood strategies (Silviani, 2000).

3.1.2: MDG 02: Achieve universal primary education

Improved mobility influences the reduction of drop-out rates and increases the quality and retention of teachers and thus improves education outcomes. In some villages in the Eastern Cape, e.g., Bolani in Port St John's Municipality, parents often delayed sending their children to school until they were old enough to undertake the grueling six kilometre-journey in difficult terrain to and from school, in part, because of the nonexistence of an all-weather road to the village supported by affordable transport services (Mashiri et al, 2009). Since the construction of the road including a bridge in 2010, circumstances have changed only for households that are relatively well-off who can afford the minibus taxi fares – otherwise the greater majority of learners still walk to school. A 'before' and 'after' study in a case study in rural Morocco revealed the impact of rural roads on school enrolment, namely, that with no paved road, only 21% of girls and 58% of boys attended school.

However, once the road was paved, the participation rate increased dramatically – 48% for girls and 76% for boys. This is also true for other human development indicators as illustrated in the Table 2 below.

Table 2: Selected human development indicators and Road Access

Indicator		Villages with all-weather road	Villages without all-weather road
1	Girls net primary school enrolment rate	41%	27%
2	Boys net primary school rate	56%	49%
3	Females literacy rate (10 years & above)	23%	13%
4	Males literacy rate (10 years & above)	53%	44%
5	Immunization coverage[1]	54%	46%
6	Contraceptive prevalence rate[2]	19%	12%
7	Pre-natal consultation	28%	14%
8	Births assisted by skilled attendant	58%	39%
9	Births at home	85%	91%
10	Post-natal consultation	7%	5%
[1]Fully immunized 12-23 months based on recall & record			
[2]Percentage of married women of age 15-49 who ever used conception			
Source: PIHS, 2001-2002			

Improved mobility and access create opportunities for children to participate fully in education processes, substantially improve maternal health and significantly reduce infant mortality.

3.1.3: MDG 03: Promote gender equality and empower women

Empirical evidence (Mashiri et al, 1998; 2013) from rural areas suggests that women and girl children travel more, longer and carry heavier loads than men, men as household heads have primary access to technologies e.g. motorized vehicles and intermediate means of transport, transport infrastructure and modes are often not universally designed for men and women. While women and girl children are significant transport stakeholders in their own right, they are routinely left out of the decision-making process relating to transportation. The Bayam Salam Women, who are rural entrepreneurs in Cameroon, have been found to be more susceptible to bribery at road-blocks as they are forced to sit on the roofs of minibus taxis to protect their merchandise (Meli, 2007). This leaves them more *'accessible'* to officers. They are susceptible to sexually transmitted diseases, including HIV/AIDS, because transport operators frequently demand sexual favours in return for seats. These traders are also exposed to sexual harassment when using community paths to access suppliers *(ibid).* In South Africa, while employment intensive works under the banner of the Extended Public Works Program such as the Siyatentela program in Mpumalanga has empowered women, it has not been strong on gender equality as men undertaking similar works are paid relatively more than women (Mashiri et al, 2009).

3.1.4 MDG 04 and 05: Reduce child mortality and improve maternal health

In general, more than 60% of people in poor countries live more than 10km from a healthcare facility. There is a clear association between infant, child and maternal mortality rates as well as health-seeking behavior and distance to healthcare services (refer to Figure 2) (Edmonds, 1998; Mashiri et al, 2008). Not surprisingly, for example, in the Philippines, **a** case study in Cebu revealed that a 10% increase in distance from a hospital was associated with a 2% increase in infant, child and maternal mortality rates. In terms of interventions, a case study in Dowa in Malawi showed that the introduction of eRanger motorbike ambulance doubled district-wide facilitated deliveries and maternal mortality rate dropped by almost half in the first 12 months (Czuczman, 2007).

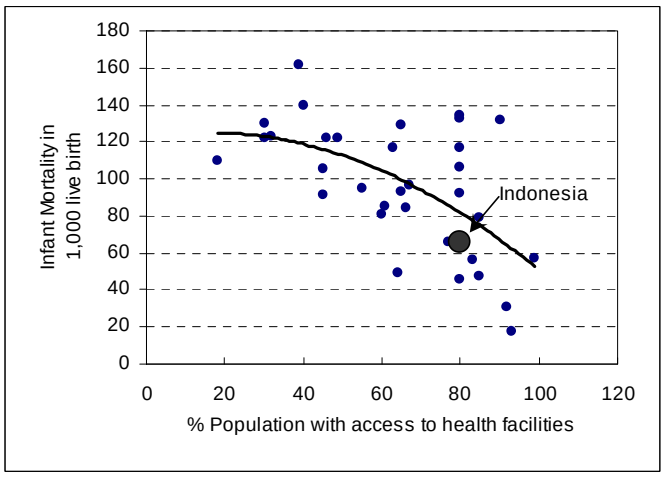


Figure 1: Infant mortality and access to health service in 34 developing countries, 1985-1995 (MDG 5) *(source: Edmonds, 1998)*

3.1.5 MDG 06: Combat HIV/AIDS, malaria and other diseases: African and South Asian case studies demonstrate the strong link between the proliferation of HIV/AIDS and the development of transport corridors (Mashiri et al, 2004). Twenty-five case studies in Latin America, Asia and Africa researched links between mobility and health from different perspectives using the networked research approach and found that health-seeking behaviour is significantly affected by mobility and access considerations, and that interventions such as the Healthy Highway Project in India and the Azerbaijan Highway Project II are often hampered by, among others, poor coordination between the health and transport sectors (IFRTD, 2008; Mashiri et al, 2008).

3.1.6 MDG 07: Ensure environmental sustainability

The transport sector is a significant contributor of greenhouse gases (GHG). The rural transport sector thus needs to exploit the potential for minimizing its externalities through, for example, experimenting with and developing environmentally sustainable technologies such as green roads and gravity ropeways in Nepal (good practice examples), integrated rural rapid public transport networks, development of traditional waterways and the increased use of non-motorized transport. In addition, research on participatory poverty assessments reveals the importance of the environment to poor people (IFRTD, 2007). With attention to the environment in infrastructure development, the poor can benefit from improved livelihood opportunities, better health and reduced vulnerability. In terms of livelihoods, environmentally sound design and maintenance is often compatible with labour-intensive options.

3.1.7 MDG 08: Develop a global partnership for development

Transport forges a life-link between rural communities and their markets, puts isolated communities in touch with their representatives, sustains important social networks and empowers communities and individual inhabitants by delivering freedom of movement. In addition, rural roads connect rural communities to the national network, which in turn is connected to international corridors thus underlining the interconnectedness of the global village. The need to continually improve these roads (and transport services) to ensure integration internally and externally and thus foster these partnerships for development cannot be over-emphasized.

3.2 Towards a framework for improved transport service delivery

"…Give me six hours to chop down a tree and I will spend the first four sharpening the axe…" Abraham Lincoln

3.2.1 S'hamba Sonke Road Program

In order to deal with the massive backlogs of transport infrastructure provision, and by extension, improve service delivery, DOT developed and is implementing an innovative program termed S'hamba Sonke (SSP). SSP provides a set of principles to guide the prioritisation of infrastructure investments to maximise the economic impact and

development multipliers for maintaining and upgrading South Africa's provincial road network (DOT, 2011). SSP also introduces road maintenance methodologies that are specifically designed to create jobs, support enterprise and cooperative development as well as to build the productive assets of resource poor communities on an unprecedented scale *(ibid)*. SSP was nationally launched on the 18th April 2011 at the Chief Albert Luthuli International Convention Centre in Durban. Figure 3 paraphrases the strategic intent of the SSP undergirded by five pillars. The objectives of the program include:

- Strengthening the regulatory framework governing road maintenance
- Ensuring that the programs, projects and systems of S'hamba Sonke are mainstreamed into provincial departments of roads and transport
- Ensuring that the *'public good'* associated with new access and mobility is maximized by prioritizing those transport corridors that will impact on sustainable social and economic upliftment and by coupling road construction and maintenance programs with people-centred road safety initiatives
- Developing a more inclusive road maintenance industry with particular emphasis on the inclusion of vulnerable population sectors, and
- Strengthening the monitoring and evaluation of road maintenance programs, projects and budgets.

3.2.2 Rationale for the introduction of SSP

While the role of the SSP in providing employment is unquestionable, it has also been singularly imperative to ensure that the value-for-money in terms of the actual work undertaken on these mostly rural roads is not only high, but also has far-reaching impact on the multiple livelihoods strategies of rural communities. Given the fiercely competing needs for funding from treasury, clearly, the need to understand the transport infrastructure requirements for advancing the socio-economic development agenda has been considered pivotal. Once this vision has been crafted, it is then crucial to unpack the nature of these assets with a view to streamlining and prioritizing investment. This is where the Road Infrastructure Asset Management Policy (RIAMP) amongst others plays a decisive role. RIAMP, developed by DOT, is a policy instrument which sets out to effectively assist provincial and local road authorities establish, maintain and update their road asset management systems (RAMS) on an annual basis within the ambit of the Road Infrastructure Strategic Framework for South Africa (DOT, 2011). Central to RIAMP is the need to ensure maintenance is undertaken to preserve transport authorities' most prized assets on a sustainable basis, meaningful jobs are created and the technical skills base significantly expanded.

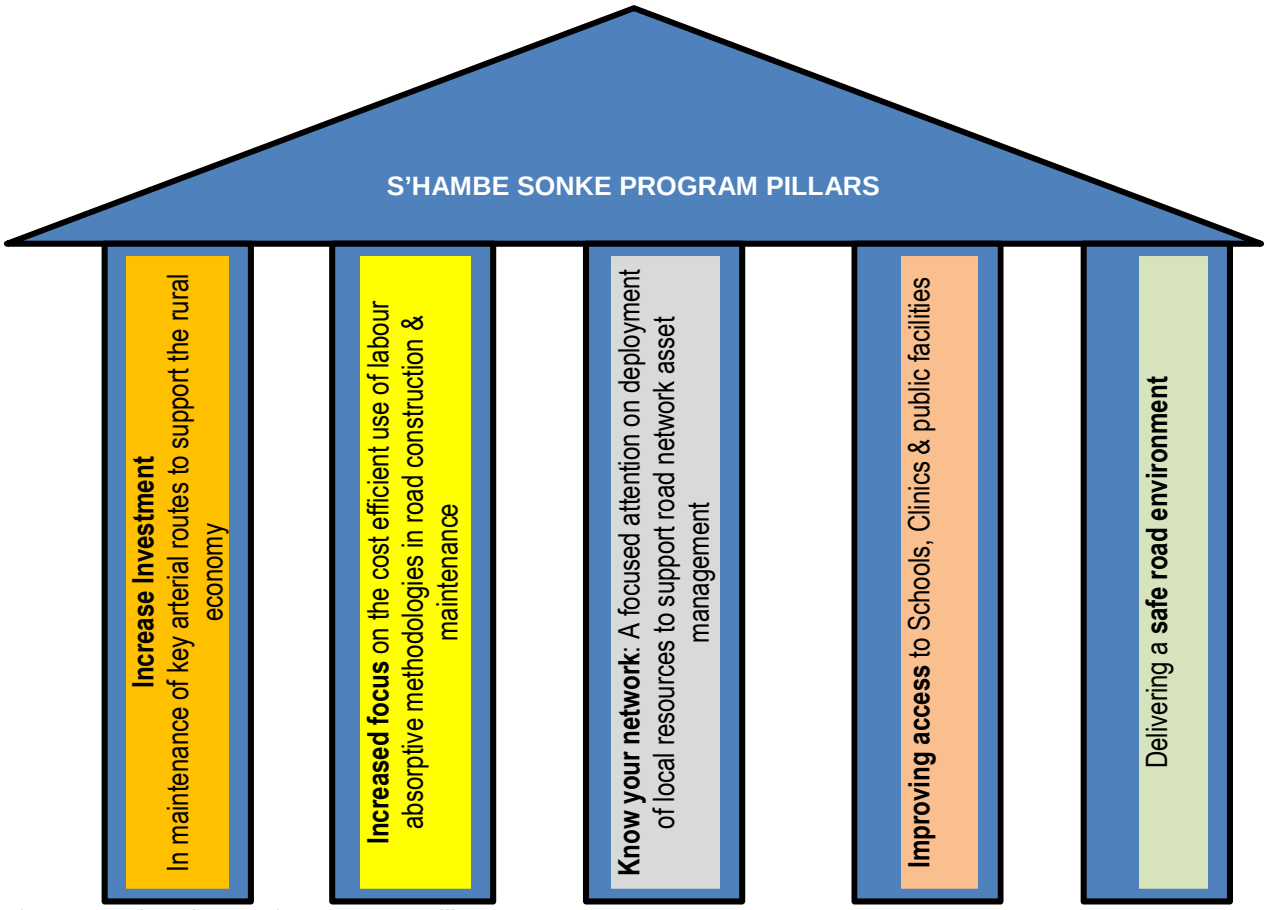


Figure 3: S'hamba Sonke Program Pillars

3.3 Rural Road Asset Management Systems

3.3.1 RRAMS Background

Road Asset Management Systems (RRAMS) are generally an amalgam of existing management systems for individual assets, which often implies that many transport authorities already have a solid backbone or at least a rudimentary platform upon which to build a transport asset management system. The enduring difference though and, by extension, the coordinating chord for a RRAMS, is largely the deployment of sustainability principles that emphasize, at the outset, integration. So, for example, integration involves the creation of a vision for transportation infrastructure for the relevant district that provides a framework for structuring interventions, linking policies with engineering standards and program development, applying sound socio-economic and business philosophies to investment decision-making processes, developing common / shared databases, as well as generating tools such as computer models for evaluating alternative strategies (refer to Figure 4 for a general process flow).

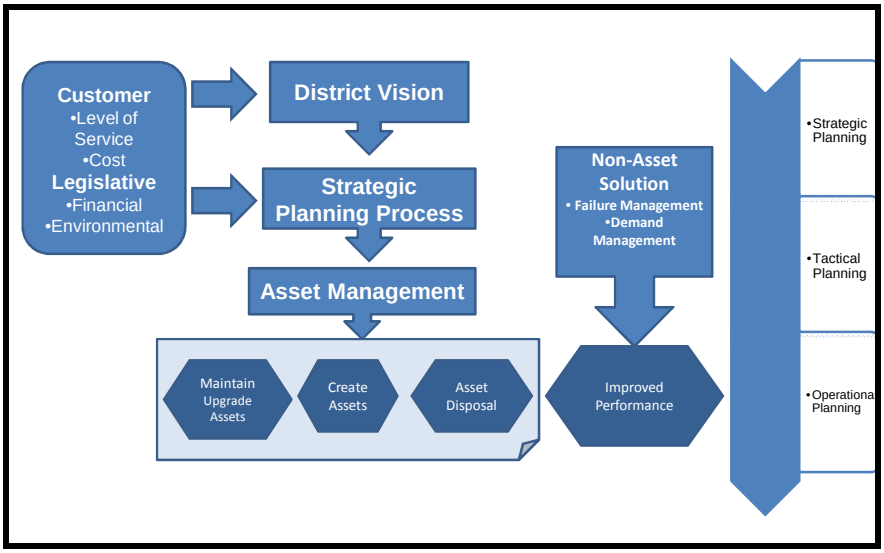


Figure 4: RRAMS general process flow

These integrative tenets thus allow the transport authority to generate and access consistent system-wide data, enabling effective allocation of scarce resources across competing demands from within the transportation asset portfolio and from across the rest of the district. Integration also provides a window of opportunity to effect horizontal and vertical integration across disciplines and functions rendering redundant the conventional engineering approach that often reigns in many transport authorities. Necessarily, a team approach underpinned by the active participation and support of other functions as well as stakeholders is central to effective transportation infrastructure asset management. It is envisaged that RRAMS will involve all the processes, policies, tools and data necessary for the effective management of all the transport infrastructure assets for which the selected districts have responsibility, such as access roads, footpaths, low-level bridges, culverts, and pavements, as well as human resources, equipment and materials.

3.3.2 Rationale for Rural Road Asset Management Systems

As South Africa's transport infrastructure is aging, some district paved roads are approaching the end of their design life and need to be rehabilitated to, at least, preserve part of the investment initially made in the infrastructure and to provide the road user with an acceptable road network free from hazards. In addition, many arterials in the selected districts especially the major corridors are susceptible to rapid deterioration due to overloading – worsened by inadequate law enforcement within the road freight environment. Overloaded vehicles cause disproportionate damage to the road network. While it is accepted that routine road maintenance should be regularly carried out to protect and preserve the road and associated road elements from premature deterioration and failure, reality has seen the road asset suffering from years of under-investment in terms of, for example, lack of investment in planned or periodic maintenance, lack of lifecycle management strategies and the use of level of service budget rather than performance based budgets. However, even with the best routine maintenance regimes in place, the road pavement and other elements would still deteriorate or be damaged in time due to a variety of factors, most significant of which are to do with traffic loading associated deterioration, environmental factors, and geometric upgrading for higher traffic volumes. It is thus imperative to put in place a management system that takes into account short and long-term perspectives to asset management with a view to entrenching sustainability.

In addition, the SAICE Roads Infrastructure Report Card (April 2011) indicates for example, that maintenance of gravel roads, which constitutes 75% of the total length of the proclaimed South African road network, has been neglected. In addition, the dearth of

road infrastructure condition data (only available for 24% of the network). Approximately 50% of the provincial gravel roads and 30% of the municipal gravel roads, for which condition data is available, are in a poor to very poor condition. Table 3 below indicates information on the extent of road network in South Africa, as well as a summary of the available network condition data. The need to develop sustainable up to date rural roads asset management systems cannot be emphasized any further.

Table 3: Extent of the road network in South Africa & a summary of available network condition data

Authority	Paved		Gravel		Total		
	Length	Data	Length	Data	Length	Data	% Data
SANRAL	16,170	16,170	0	0	16,170	16,170	100
Provinces - 9	48,176	47,088	136,640	103,733	184,816	150,820	82
Metros – 9	51,682	40,737	14,461	1,789	66,143	42,527	64
Municipalities	37,691	10,866	302,158	2,124	339,849	12,990	4
Total	153,719	114,861	453,259	107,646	606,978	222,507	
% Data	75		24		37		

Source: DOT (2012)

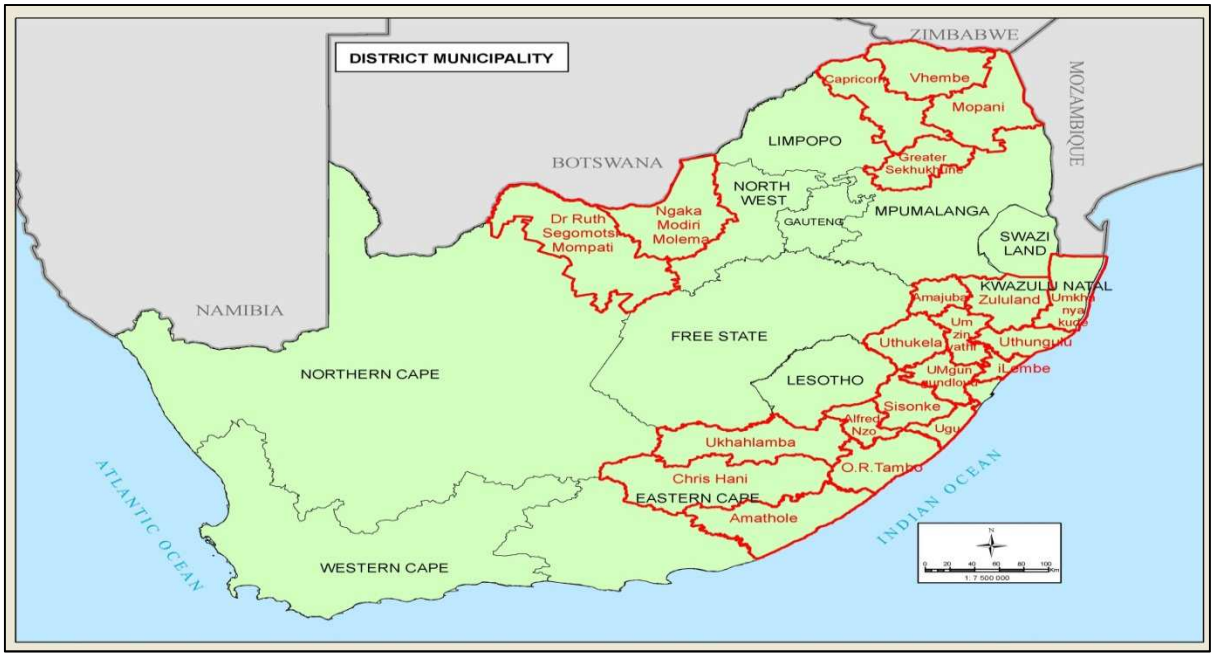
Furthermore, many municipalities' knowledge of the extent and capacity of the infrastructure assets they possess (such as knowledge of assets, demand analysis, asset creation and disposal, asset utilisation and asset maintenance) is often severely deficient and unreliable. Clearly, many of these municipalities are not conforming to the requirements of the Municipal Finance Management Act (MFMA), Municipal Systems Act and other legislation that requires them to establish a management information system to effectively manage and control their assets, maintain a complete Asset Register, and value their assets as well as prepare financial statements in accordance with Standards of Generally Recognised Accounting Practice (GRAP).

3.3.3 DOT's Rural Roads Asset Management Initiative

Table 4 summarizes the strategic intent, objectives and operational modalities of DOT's Rural Road Asset Management Initiative currently being implemented in selected districts in South Africa (refer to Figure 5). The initiative allows for economies to be derived from capacity building employing a common framework.

Table 4: Overview of Rural Road Asset Management Initiative	
Rural Roads Asset Management Grant (Source: DOT (2012))	
Strategic goal	• Ensure efficient & effective investment in rural roads through development of & collection of Road Asset Management Systems (RAMS) data to maximise its impact in terms of supporting the country's development goals on a sustainable basis
Grant purpose	• Assist rural district municipalities to set up rural road asset management systems & collect road & traffic data in line with the Road Infrastructure Strategic Framework for South Africa (RISFSA)
Outcome statements	• Improve data on rural roads to guide infrastructure investments • Reduce vehicle operating costs & extend the lifespan of rural roads
Outputs	• Collect road inventory data including condition assessment & traffic data • Set up pavement & bridge management systems compatible with national standards • Strengthen the institutional, funding & capacity building framework
Priority outcome(s) of government that this grant primarily contributes to	• Outcome 6: An efficient, competitive & responsive economic infrastructure network • Outcome 7: Vibrant, equitable & sustainable rural communities that enjoy food security
Beneficiaries & MTEF allocations	• Budgeted amount will be equally shared among 21 rural district municipalities (average – R1.7m) most of which are located in former homelands (refer to Map 1) • 2012/13: R 37.3 million, 2013/14: R39.2 million & 2014/15 R41.4 million • The grant, which will be subject to review has a life span of up 2015
Conditions	• For RISFSA Class R1, R2 & R3 roads data collection requirements include: o Visual condition data not older than 2 years for pavements & 5 years for bridges o Instrumental pavement data for roughness, rut depth & macro texture not older than 2 years o Instrumental pavement data for structural strength not older than 5 years, and o Traffic data not older than 3 years. • For RISFSA Class R4 & R5 roads data requirements include: o Visual condition data not older than 3 years for pavements & 5 years for bridges; o Traffic data not older than 5 years. • All condition data should be submitted to the national data repository as per agreed format by end of November of each year, with first submission year being November 2012. • The condition data is utilised according to applicable national COTO standards (TRH/TMH) to identify & prioritise maintenance requirements within the context of the available budget to improve the condition of the roads & extend the lifespan of road infrastructure assets. • All data collected must be made available to the national Department of Transport (DoT), South African National Roads Agency Limited (SANRAL) and the relevant provincial roads authorities • Systems developed to record data must be compatible with Department of Transport specifications
Reason not incorporated in equitable share	• This is a specific purpose grant mainly for the provision of systems to collect rural road and traffic data
Responsibilities of the transferring national officer & receiving officer	**Responsibilities of national department** • Monitoring implementation of RAMS together with provincial road authorities • Data integrity will be checked by DoT & provincial road authorities • Provide guidance on sustainable RAMS operation and standards • Facilitate training to municipalities & assist them to acquire RAMS from SANRAL • Check the quality of data captured on municipalities' RAMS
	Responsibilities of municipalities • Municipalities must make provision to maintain RAMS after the lifespan of the grant • Data for all rural roads to be updated within two years • Employment of unemployed youth, S3 Experiential Training Students & young graduate & thereby ensure human capacity at municipalities for the operation of RAMS is built • Road quality data on RAMS will be a conditionality for Municipal Infrastructure Grant (Roads)

Figure 1: Selected RRAMG Districts



Source: DoT, 2012

3.3.4 Data collection, storage and administration

Systems for managing transportation infrastructure assets often employ and are enriched by data from many sources – from within and outside a transport authority. In turn, RRAMS will be a receptacle of information for the various units in the district. It is thus essential to ensure the integrity of the data collected and stored in the system by putting in place appropriate data checking and validation procedures housed in a quality management system. Data verification could include checking for integrity, location, time, completeness and accuracy – fortified in turn by, for example, predetermining warning values, assembling historical data that can be used in control protocols and regularly calibrating field equipment.

Clearly, the data that will be loaded into RRAMS and that which is generated by the system will necessarily have a high financial value to the municipality, not least because it is costly to collect, but also because of its inherent ability to influence decision-making. Necessarily, there is a need to treat this as a valuable asset that needs to be properly looked after by a cohort of trained cadres.

It is envisaged that while RRAMS will consist of a combination of selected standard building blocks, it will also be flexible enough to respond sensitively to changes in these components, as districts' goals and priorities change (refer to Figure 6):

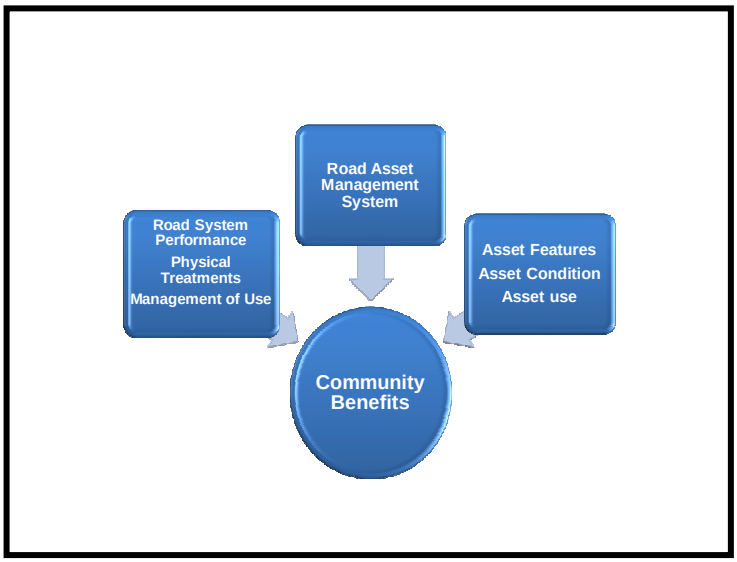


Figure 6: Elements of RRAMS

3.3.5 Establishing the RRAMS Backbone: GIS Technology Application

The development of a Road Asset Management System is necessarily data-intensive. And, because of the relatively vast amounts of spatial data to be collected from the field,

sourced from other institutions and generated from the system itself, it is imperative to employ and deploy a Geographic Information System (GIS) technology to store and perform various analyses with a view to assisting with decision-making. Ideally, a geo-database of relevant project information that will also be used to perform analyses to identify suitable / potential opportunities for project identification, prioritization, spatial alignment (of planned investments to ensure wider project impact and sustainability), funding and implementation should be developed. This would contribute to a new spatial information system competency in the districts. The approach will consist of several components (each with several main activities) such as development of base information, data auditing, sourcing and researching, data uploading and cleaning, analyses and churning of results. Training will be a key aspect of the methodology.

3.3.6 Capacity challenges

The effective implementation of RRAMS is likely to be hamstrung by significant institutional, human and technical skills deficits in the selected districts and their local municipalities, including, poor terms and conditions for those who are charged with roads management and relatively lax managerial accountability. Provincial departments have similar capacity challenges as most of their district offices typically operate at 30% to 40% under-capacity (MDPWRT, 2013). Most local municipalities do not have Transport Functions – and where they exist, the officers (often traffic officers double up as transport planners) have not been trained in transportation planning and development. In fact, deficiencies in productivity and organisational performance in municipalities are, in part, attributed to staff shortages. In addition to this shortage of technical capacity, there is also the lack of appropriate technical guides, and in some cases norms and standards. Furthermore, as illustrated by the Mpumalanga Province, most local municipalities do not have integrated transport plans (ITPs), while districts currently use outdated ones (Mashiri et al, 2013). This has tended to negatively influence transport inputs into integrated development plans (IDPs). So, even when RRAMS has been established, districts and their local municipalities may be unable to utilize the instrument effectively, which may largely remain active only on the servers of the service providers.

Lastly, observations and experience in the field confirms the assertion that synergy and collaboration between provincial, district and local municipality in terms project implementation, is decidedly laboured – each one of the players is overly protective of their given turf. Thus the need to strengthen the Transport Forum as an instrument to foster collaboration in planning and implementation through participation and engagement of all stakeholders cannot be over-emphasized – a balancing act underpinned by cooperation, co-creation and co-management. While well-functioning and proactive transport forums are ideal communication platforms for a district and its local authorities to exchange ideas, information and plan collaboratively, their potential role in terms of strengthening and facilitating transport service delivery has clearly been underestimated if their current moribund status is taken into account. Finally, even though cooperative governance is a learned art, there needs to be demonstrated commitment on both sides to make it work overtime to facilitate service delivery.

4. CONCLUDING REMARKS

Physical infrastructure covering transportation, power and communication through its backward and forward linkages facilitates growth, while social infrastructure including water supply, sanitation, sewage disposal, education and health, which constitute primary services, has a direct impact on the quality of life. Without this combined infrastructure, rural areas are unlikely to achieve the growth and development levels required to make a

significant dent on poverty. The need for holistic rural infrastructure planning and investment to achieve the developmental potential of the rural areas cannot be over-emphasized.

Transport interventions such as RRAMSs have the potential to influence the quality of rural transport infrastructure, thereby not only increasing the lifespan of the asset especially against a backdrop of constrained funding, but also contribute to attracting transport services, in part, because of the reduced vehicle operating costs, thus impacting substantially on the cost of doing business in rural areas. In association with other interventions, this tends to deliver better livelihood outcomes, including building on their individual and community assets as well as registering a significant dent on poverty.
A final conclusion is evident – It is imperative to move away from *'business as usual'* and reimagine *'rural futures'* in terms of transforming business, science and government. For business it is about harnessing and unleashing the power of enterprise to provide 'public good' infrastructure such as multi-modal facilities, freight villages, truck-stops, multi-storey parking facilities in small towns that experience severe gridlocks such as Mthatha with a view not only to making a commercial return, but also more importantly, to transforming the socio-economic landscape for sustainable livelihoods. For science, it is about harnessing the power of research and innovation to develop better frameworks, robust methodologies, improved organizational methods and improved materials for providing and maintaining infrastructure that supports the socio-economic trajectory of the districts in a sustainable manner. And lastly, for government, it is about internalizing the ethos of a developmental local government where commitment to investing in local value addition, facilitating social capital formation, skills development, institutional agility and capacity, effective local demand and access to information required for effective decision-making, strengthening local-level planning and access to natural resources are key and leadership is priceless.

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