

RURAL TRANSPORT RESEARCH, DEVELOPMENT FOOTPRINTS AND FOOTSTEPS IN SOUTH AFRICA: A CASE FOR BISECTING TECHNOLOGICAL INNOVATIONS AND SOCIO-ECONOMIC DEVELOPMENT MANDATES

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ABSTRACT

This study provided a quick overview of rural transport research and development landscape in South Africa. It achieved its main purpose through a bi-cameral approach. First, boundaries framing the rural transport research and development agenda are marked. Second, rural transport and research development innovations and applications tested in South Africa are discussed. A synthesis of the two pronged perspective provided a departure point for informing deeper dialogue, rural transport policy options and intervention levers that can be employed in transforming South Africa's rural areas growth and development spaces, places and cultures challenges.

Keywords: *rural transport, development, innovation, developing countries, South Africa*

INTRODUCTION

The World Bank Transport Business Strategy (2008-2012) presents instructional findings regarding rural road asset development in developing countries (World Bank, 2001; 2008). First, it is observed that approximately 1.2 billion of the world's poor still lack access to an all-weather road. In addition between 40 and 60 percent of people in developing countries live more than 8 kilometres from a healthcare facility. Few transport services exist in rural areas of developing countries especially deep and peripheral communities (IRF, 2009). In some rural regions of developing countries less than 15% of roads are paved (IRF, 2005). Without effective rural transport systems, the MDGs and the majority of rural development and poverty focused initiatives, agriculture and growth endeavours are substantially constrained (FAO, 2005). In short, if improvements are to be made towards tackling rural poverty and encouraging economic development one potential starting point is addressing the basic rural asset portfolio. Some insights of this is reviewed in this paper, in terms of the innovative and sustainable provision of rural transport infrastructure, services and local community access roads.

Of the approximately 2.3 million km of classified roads in Africa approximately 21 per cent is paved (World Bank, 2006). In addition, approximately 2.0 million km of classified roads in Sub-Saharan Africa (SSA), only 14 percent are paved (IRF, 2005). Road maintenance is therefore a universal problem in Africa. It is estimated that approximately 1.7 million km of unpaved roads in SSA still need to

be converted into sustainable paved routes including the unclassified routes not included in this estimate. Finding sustainable options and strategies for rural community access provision and maintenance is therefore of utmost importance. Recent studies in Sub-Saharan Africa confirm that one of the main reasons for the poor maintenance record of rural roads is the attempt to consolidate rural road rehabilitation and maintenance only at the local government level, instead of approaching the basic traditional units of the society, that is, chieftaincies, villages and extended families. These grass roots entities have vested interests in the well-being of their own roads.

The main purpose of this study was to establish a rural transport and development baseline intervention departure point in South Africa. Such a baseline would provide a platform for the generation of innovative pathway options that may be adopted in addressing the rural transport and development challenge in South Africa. Two major research questions informed the study. Firstly, it was important to briefly locate the existing forms of rural transport constraints and obstacles inherent in contemporary South Africa. Secondly, from a policy and development intervention perspective, it was essential to explore rural transport and development intervention options and opportunities that can be harnessed to remedy the situation.

METHODOLOGY

The study employed a mixed research survey technique. Qualitative and quantitative analytical methods were used to triangulate and validate research findings. The article further employed innovative analysis of re-cycled rural transport data and information to isolate key themes for deeper interrogation. The output of this combined analysis is fused with primary data analysis of rural transport and development indicators to generate a rich tapestry of interpretations regarding the rural transport and development themes in South Africa. In brief, spatial analysis of access to services and facilities; type, distribution, coverage and condition of infrastructure and services; physical observation surveys and analysis; rapid community appraisal surveys; benchmarking analysis and the story telling technique constitute the main research methodology and design parameters informed by this study.

THE SOUTH AFRICAN RURAL TRANSPORT INFRASTRUCTURE AND SERVICES SCENARIO

Approximately 40% of the South Africa's road network has reached the design lifespan and the majority of rural based schools and hospitals have no access to an all weather road (COTGA, 2009). Approximately 80% of South Africa's road network is older than the 20 year design life and R75billion is estimated to be the funding requirement needed over the next five years to arrest road deterioration and decline in service levels. Provincially, KwaZulu-Natal has the highest proportion of roads in poor to very poor condition (approximately 50%); followed by Mpumalanga

(approximately 38%) and both the Eastern Cape & North West (approximately 30 %). The Best paved road networks are found in the Free State and in Limpopo Provinces. According to the most recent road visual condition survey (VCI), in eight of the nine Provinces, over 50% of the gravel road network is in a poor to very poor condition. The largest percentage of gravel roads in poor to very poor condition can be found in the North West Provinces (close to 80%), followed by the Eastern Cape , Mpumalanga & Limpopo (approximately 65%) and the Western Cape (Close to 55 percent). Gauteng has the least percentage of gravel roads in poor to very poor condition, but this can be explained by the fact that they only have approximately 1,900 km of gravel roads to maintain (1 percent of the total provincial gravel road network) (Department of Transport, 2010).

It is of interest to note that the demand for pedestrian bridges and access roads is huge particularly in rural KwaZulu-Natal, Limpopo, Mpumalanga, Eastern and Western Cape provinces. As an example, in a submission to the Finance and Economic Development Portfolio Committee in April 2006, it was put on record that there is a need to be build 146 pedestrian bridges province wide in KwaZulu-Natal. With regards to access roads, it was reported that 2 740 km needed to be constructed at an estimated cost of R687 million (Chakwizira et al, 2008). This was despite the construction to successful completion of 14 pedestrian bridges and over 160km of access road projects. However, nationally access and mobility infrastructure and services backlog still remains huge (DoT, KwaZulu-Natal, 2007). It is therefore instructive that innovations solutions to addressing rural mobility and connectivity deficits and shortfalls should be generated if rural areas are to be enabled to develop and become competitive and complimentary to the urban economies.

RURAL TRANSPORT RESEARCH AND DEVELOPMENT APPLICATIONS HISTORY: THE UNFINISHED REVOLUTION

Understanding rural transport development research issues and emerging challenges in South Africa and by extension the developing countries requires a contextual appreciation of rural travel characteristics and trip generation movements (Chakwizira et al, 2008). Such local content knowledge is pivotal in the generation of innovative and sustainable transport solutions. The departure point of this article is to argue that rural transport research and development in South Africa and by extension in the developing World is the history of an unfinished revolution. This is premised on account of the massive rural transport infrastructure and services deficit and backlogs that exist in such countries. Currently Africa transport infrastructure deficit is estimated at USD 100 billion. In SADC the current transport infrastructure deficit is estimated at are USD 100 billion (IRF, 2009). This speaks to the rural transport and infrastructure challenge that pervades both the urban and rural areas.

A perennial thread that runs throughout rural transport developing countries agenda is the compelling need to construct, develop and maintain sustainably a critical mass of rural transport infrastructure and services. Such a critical mass is required to fast track the growth and development of the rural areas socio-economic environments

(Mashiri et al, 2008). It is essential that access and mobility constraints in rural communities be removed. These range from geographical isolation, fragmented and dispersed settlements, transport and social infrastructure and services deficits. The outcome of these rungs of obstacles is that rural communities remain isolated and excluded from participating in the main stream economic sector. In addition, such disadvantages place heavy travel and transport burdens on rural transport dwellers and those who may have to conduct business in such environments. A 2010 survey on rural transport and persons with disabilities (PWDS) study conducted by CSIR Built Environment in Leroro and Moremela villages of Thaba Chewu Municipality, Mpumalanga discovered that upward of 78.6% of rural travel is short but mandatory trips. In addition approximately 75.3% of the trip were made by either walking, bicycling or through the aid of non-motorised transport such as animal/donkey drawn carts.

However, a sobering rural transport discovery was that while over 95% of persons with disabilities owned wheelchairs, over 40% of those sampled in the study did not utilize wheelchair for movement and travel. The reason related to the lack of well appointed and developed rural transport non-motorised transport infrastructure such as well designed and paved pedestrian walkways/footpaths, bicycle walkways, pedestrian footbridges and low level crossings with provision for safe and secure navigation by wheelchair users. The terrain in the study area is steep, mountainous and rugged rendering non-independent wheelchair users especially of non-electric/battery powered units. The study recommendations suggested that inclusive rural transport design and applications development could be a feasible alternative. This could take the form of using locally available resources such as stones, or locally manufactured bricks and pavement blocks to pave the paths used by both pedestrians and wheelchair users for example. In addition, investment in grading and improving the profile of such paths and overall local level inter and intra roads were also identified as an area requiring priority.

RURAL TRANSPORT TECHNOLOGY APPLICATIONS AND PERSPECTIVES

Given the massive investment in rural transport and social infrastructure required in rural and developing countries, it is important to broaden and expand the basket of sustainable road solutions that can be applied to remedy the situation. One area where research has advanced is in the applications and utilization of advanced soil binders to address the problem of slippery, muddy and dust infected rural roads. In Tanzania for example the application of otta seals on rural low volume gravel roads has been discovered to be quite effective. Harnessing much more widely the application and replication of such technology and similar applications could go a long way in addressing rural road transport challenges.

In South Africa, the CSIR, Built Environment since 1995 (then Transpotek division) has consistently focused on researching and seeking to generate a raft of

rural integrated technology transport solutions. One such integrated rural transport technology package is the customized integrated rural mobility and access programme (IRMA) (See Mashiri et al, 2008 ; Chakwizira et al, 2008). IRMA is based on the famous International Labour Organisation (ILO) developed integrated rural accessibility planning (IRAP) concept. IRMA aims at the generation of sustainable rural transportation and services solutions. The approach realizes that rural transport and development challenges can be primarily from the mobility or locational perspective. The mobility perspective stresses the need to deploy and provide local level rural transport infrastructure and services such as construction of all weather roads, improvement of footpaths, pedestrian bridges and low level crossings.

This makes rural local level transport movement and circulation more efficient and effective. On the other hand the locational perspective emphasizes the strategic spatial location and placement of facilities and services in rural areas. If services and facilities can be located closer to the people/rural communities, this would take away the need for long trips and different forms of movement. This concept vision backs the creation of self-containing and sufficient rural neighbourhoods and communities. In addition, the IRMA approach is utilized making use of labour based and intensive principles. Local resources such as labour and skill (women, youths and the unemployed), stones, timber, construction materials, local companies (Small to medium enterprises) are employed to build capacity and as a skills transfer exercise. In Albert Luthuli Municipality in the Mpumalanga area this approach was piloted by the CSIR together with the Mpumalanga department of Roads and Transport, Albert Luthuli Municipality, private sector and civil society between the years 2002 - 2010. In year 2002, the Mpumalanga department of Roads and Transport approved a rural transport strategy, whose rural transport component approach revolved around the IRMA concept. This laid the policy foundation for the implementation of the next generation of rural transport infrastructure projects.

The pilot phase of the IRMA project in Mpumalanga has been successful as accounted by the impact evaluation results of a 2009 CSIR conducted impact study. Over 90% of the respondents in the Albert Luthuli pilot study area said that there was an improvement in terms of movement and accessibility to socio-economic services such as schools, shops, clinics, government offices and markets. Upwards of travelling distances measuring 8km have been reduced to approximately 3 km. This translates in time and cost savings which can be redirected for productive purposes. Table 1 presents a summary of the recent impact study. Out of the 200 community members who were employed on a temporary basis on the different project sites over an average period of two months, 123 were women while 77 were men, roughly reflecting a proportion of 60:40 - which meets the general guidelines of public works projects especially in rural areas (where women outnumber men and often occupy the extreme end of the poverty spectrum).

In addition, 50 percent of these labourers constituted the youth. The process of recruiting labourers which sought to target the most vulnerable in the community was undertaken by respective ward councillors, traditional leaders and contractors

and was informed by a household socio-economic profile audit. There was a commitment to the empowerment of women and the youth by the project and thus they were specifically targeted. Given that women often have a 'societal duty' - that is an unwritten expectation to look after their families, predictably their incomes were largely employed to achieve this end, thereby reducing leakage of project funds out of the community.

Table 1: Impact of IRMA Infrastructure on Community Infrastructure service levels & unfreezing potential to access opportunities and services.

Tasks and Activities	Better	Worse	Unchanged
School attendance	80.0	0	20.0
Going to church	67.4	0	32.6
Local clinic visitations	70.4	0	29.6
Movement of mobile clinic	89.7	0	10.3
Visitations to local markets	75.0	0	25.0
Visitations to community centres	96.6	0	3.4
Visiting neighbouring communities	91.3	0	8.7
Visiting other residents	69.0	0	31.0
Travel to main towns	93.1	0	6.9
Travel to pension payout points	82.8	0	17.2
Fetching water	69.0	0	31
Collecting firewood	93.1	0	6.9

Source: Mashiri et al, 2010

Rural transport differentiated pathways out of poverty: An interesting aspect about rural transport and development endeavors is the need to explore the scope for providing and expanding alternative livelihood and survival pathways out of poverty. In South Africa, a number of provincially based rural roads local level infrastructure good practice cases exist (see works by Cleggy, 2003; Mashiri et al, 2008, 2009). Traditionally, rural local level road construction and maintenance has excluded locals such as women, youths and the unemployment. Contractors have arrived in rural areas with a fully fledged team/gang of labourers and high-technology. The impact and contribution of such activities to the local economy has been very minimal.

The quest to reverse such trends and use local labour and skills for routine labour based rural roads maintenance program has led to the development of innovative rural roads maintenance programs in South Africa as has happened elsewhere in developing countries. Examples of labour based rural roads construction programs in South Africa include Zibambele (Kwa-Zulu Natal), Siyatentela (Mpumalanga) and Gundolashu (Limpopo). These programs target indigent households, mostly women, youths and the unemployed. The screening process is done through an inclusive and transparent locally based village and traditional systems of vetting. A recent impact study conducted by CSIR, Built Environment indicated that in Mpumalanga under the Siyatentela program which is 100% female targeted, 88% of the respondents from the study sample confirmed that they used the income earned from the project in the local area, town and nearest big city.

In addition, an opinion survey from road users and community members in the study area regarding whether the roads being maintained by the women were

contributing to socio-economic upliftment was positive. It was discovered that the maintenance of these roads have increased access to off-farm employment by 34%, access to firewood by 30% and access to water collection points by 19% (Mashiri et al, 2008). While the programme has its own teething problems, the women have established own savings clubs and use the money to meet educational requirements for children, construct houses, extend dwellings and by various capital development equipment for poultry and market gardening purposes for example. However an area requiring further improvement is migrating and perhaps collapsing all different labour based initiatives in the country into one as typified in India where a National Rural employment Guarantee Programme (NREGA, 2005) exists.

CONCLUDING REMARK

The classical spatial apartheid experiment employed prior 1994 by the government in South Africa failed in areas of space, place and culture integration. Currently in South Africa's previously deprived and marginalized rural communities experience the greatest rural transport challenge in making the first and last mile of any trip or journey performed. This challenge strongly confirms the need to provide all weather roads that link rural communities with the greater economy of the region and world at large. The generation of sustainable rural transport solutions that utilize a local resource based approach to road infrastructure construction, maintenance and sustainability then becomes an attractive proposition.

Currently in South Africa, approximately 40 % of the national roads infrastructure has reached its design life and requires urgent rehabilitation. The cost of rehabilitation and maintenance is estimated at R7 Billion. The interesting paradox is that in this scenario, how prioritized is rural transport. Urban bias in terms of developing urban roads and inter-city roads legacy still continues. However, in the overall context transport as a sector receives little governmental priority when compared to sectors such as health, education and defense. This may call the need for advocacy work to sensitize and capacitate decision makers regarding the prioritization and budgetary allocation of the roads and transport sector in developing countries. While lately in South Africa a lot of transport investment has occurred, this was focused on the World Cup 2010 host cities and precinct transport areas around that. This did not filter to rural transport band travel initiatives. Indeed the rural transport sector needs serious branding so that it can be competitive and an attractive investment area. Perhaps there is credibility in the growing voices calling for ring fenced rural transport funds. These would be essential in developing rural local level transport infrastructure and services.

Perhaps the greatest challenge that rural transport and development practitioners have to contend with in rural South Africa is the innovative and sustainable deployment and provision of a critical mass of transport infrastructure and services mix that would stimulate local productivity, link and liberate communities, thereby enhancing social, economic and spatial cohesion, integration and transformation of spaces, places, people and cultures.

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