

TRANSPORT - A CATALYST FOR SOCIO-ECONOMIC GROWTH AND DEVELOPMENT OPPORTUNITIES TO IMPROVE QUALITY OF LIFE

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ABSTRACT

One of the main objectives of the Expanded Public Works Programme (EPWP) is to create jobs in order to address poverty alleviation. It is a well-known fact that road works provide good opportunity for labour-intensive activities. However, rather large and ambitious road projects are often selected, with resulting technical and specification barriers. In an effort to accommodate unskilled labour from rural communities, projects are often unbundled to the point where the project management costs start to increase exponentially and the result is that less money reaches the poor and affected communities. A philosophical approach is sketched where community facilities, schools, community centres, clinics, etc. are used as the focal point for the provision of such appropriate facilities for labour-intensive work like cycleways and footpaths. In this way road safety, accessibility and need for job creation can be “triangulated” to provide low cost facilities for cyclists and pedestrians alike. Various person and Small Medium and Micro Enterprise (SMME) friendly construction techniques, which make maximum use of local materials, low skill level labour and people friendly technologies, have been developed for road construction and are well published. These technologies are discussed for lower entry barriers and made more applicable for community based construction of footpaths and cycleways. The end result is low cost appropriate technology applications for the improvement of accessibility and mobility needs of previously disadvantaged rural communities and creating sustainable jobs in the process.

1 INTRODUCTION

Socio-economic development and growth is generally measured with indicators such as life expectancy and levels of employment. Unfortunately, there does not exist a simple figure to express a feeling of safety, or a community’s scope of involvement in civil society. It is glaringly obvious that poverty, crime and illiteracy are interlinked and are widespread in rural communities throughout South Africa. These communities also suffer the most from want of infrastructure and basic service delivery. (Muradzikwa, 2004)

Limited access due to lack of infrastructure significantly diminishes an individual's ability to earn a living. Rural communities have limited access to health and education facilities as a direct result of the lack of mobility and constraints on travel. The rising costs of transport and vehicle maintenance further compounds the problem.

The Expanded Public Works Programme (EPWP) is a key government initiative which aims to provide work opportunities for unemployed individuals through inclusive economic growth. In the infrastructure sector, the EPWP aims to increase labour intensive endeavours in government-funded infrastructure projects (Department Public Works, 2016). Road construction projects increase the mobility and accessibility of previously disadvantaged groups. The value of these roads as an asset is derived from the contributing factor to other assets, such as clinics, hospitals, schools and businesses. Simply put, the more nodes connected by roads, the greater the worth of these roads and thus, the greater the worth of construction projects aimed at either building new roads, or upgrading and maintaining existing ones (Muradzikwa, 2004).

Pedestrians represents 35 – 40% of all fatalities reported in road accidents (Arrive Alive, 2016). One of the explanations identified is the fact that pedestrians tend to use paved roads as walkways, particularly in rural areas. Where limited or no shoulders are present on roads there is obvious conflict between motorised and Non-Motorised Transport (NMT). Labour intensive construction practices are better suited for roads with low traffic volume and low speed requirements, such as pedestrian and cycle ways. The construction of these NMT routes will greatly improve access and mobility in areas where car ownership is generally low.

Research has found that short term projects do little to alleviate unemployment in poverty stricken areas for extended periods. This is because the skills and training given, along with experience obtained, were not significant enough to alter current labour market performance (McCord, 2004). The skills retained in a rural community after a project has been completed, is a small fraction of the resources invested in transferring knowledge and training. This is partly due to a number of trained individuals relocating to larger towns and cities in the hope of acquiring a job where their skills can be applied.

This essay is aimed to address the need for labour-based roads or basic access projects in rural and poor communities throughout South Africa. The emphasis must largely be placed on projects of longer duration where skills and training in specific fields can efficiently be harnessed. A paradigm shift away from short term construction projects will bring longer term maintenance endeavours into the fold.

2 CURRENT SOCIO-ECONOMIC CONSTRAINTS FOR EPWP PROJECTS

2.1 Poverty

McCord (2004) conducted a study on the impact of EPWP projects in two rural communities. It was found that short term employment does not facilitate a community to accumulate wealth or to move out of poverty. An ideal scenario would be where an employed member of such an impoverished community spends his/her money where it can further benefit the same community. For example, a labourer earns R 100 and spends R 40 at a local informal shop on vegetables, who in turn buys new produce from the local farm. In this and similar scenarios, every rand earned is reinvested three times or more in the same community. However, in reality the lack of access inhibits the movement of an individual in such a way that hard earned money is spent outside of the community. It is a matter of whether it is easier to travel on existing roads to larger chain stores, or traverse over undeveloped terrain by foot. This is assuming an individual is aware of the entrepreneur's business, seeing as lack of access negatively impacts the entrepreneur's opportunities where money can be earned.

In short term construction projects the actual time viable for community members to earn money is limited. In this sense, a construction project that runs for a year is not as beneficial as a maintenance project that runs for 3 years. The South African National Roads Agency Soc. Ltd. (SANRAL) aims through its infrastructure projects to act as a catalyst for growth in other areas, build capacity, develop enterprises of smaller sizes, alleviate poverty and elevate the status of women in rural communities. SANRAL is tasked with maintaining South Africa's vast road network. Through these maintenance contracts, they achieve the goals they set out to accomplish by employing impoverished individuals, offering training and making use of labour intensive methods of construction over extended periods of time. (The South African National Roads Agency Soc. Ltd. , 2016)

2.2 Project Sizes

A common misnomer is for larger projects to be broken up into smaller projects. This is partly done to improve community access and qualification for the work. The truth of the matter is that there is an indirect relationship between the project size and the project management input required (McCord, 2004). The costs involved with employing project management teams for a series of small projects are magnitudes more than if one project with one project management team were to be employed. This means that more funds are generally being spent on specialist personnel outside of the rural communities. The end results are that less money and skills development end up in the community.

If the duration of the projects are short, it will further add to sustainability concerns, despite the fact that construction projects of shorter duration have a positive influence in the skills transferred during the life of the project (McCord, 2004). Contracts, such as those mentioned from SANRAL, enable communities to gain much needed experience. However, McCord (2004) clearly states that the duration of employment is the most important factor when considering whether the skills transferred and experience gained have lasting influences on labour market

performance. It can be assumed that the most skilled individuals are the most likely to pursue job opportunities elsewhere, once a project has drawn to completion in the immediate environment. The younger and more competent members of communities are drawn to larger towns and cities to form part of the active labour markets (Oranje, et al., 2008). Less driven or motivated individuals find themselves unable to utilise their new skillset, and as with all skills, without constant practice and experience, the skills soon are forgotten.

2.3 The Politics of Funding

Muradzikwa (2004), states that one important component for rural road infrastructure development is community involvement in project prioritisation that generates some form of 'ownership' of projects. However there are enormous rural road infrastructure backlogs and insufficient maintenance and construction budgets. Prioritisation of transport related infrastructure should ensure that the facilities which add the greatest capital-deepening value should be selected and financed ahead of other projects in a particular region. These priority projects refer to roads that will yield the greatest potential or opportunity for further income-generating capital projects with the specific goal to keep money exchanging hands in a specific community.

In terms of funding, rural municipalities are extremely dependant on government grants and loans. They do not have access to a substantial tax base as the more affluent municipalities do. The residents themselves are unable to pay for services and are seldom able to maintain the existing roads infrastructure through their own exertions. (Koelble & LiPuma, 2010)

3 SYNTHESIS OF APPROPRIATE ROAD BUILDING TECHNOLOGIES

3.1 Appropriate Technology and Community Empowerment

There is an untapped well of empowerment potential for appropriate technology usually applicable to road construction. The extrapolation thereof is significantly suitable to cycleway and footpath construction. Direct labour in labour intensive construction can be seen as the entry point to eventually contribute towards community and previously disadvantaged individual (PDI) empowerment.

The key to such empowerment and skill development lies in the use of small plant and appropriate technology as stepping stones (Horak, et al., 1996). In analysing known labour-intensive construction techniques and simulating the old construction technologies for road construction small plant; like a plate vibrator, wheel barrows, rakes, forks and spades; could be used very effectively to produce quality end products and empower budding entrepreneurs. In the case of cycleway and footpath design and construction the use of small plant and labour enhancement become even more relevant for appropriately lower standards than needed for even the lowest traffic volume roads. (Horak, et al., 2004)

It has been proven that aspects of road construction, especially construction technologies that favour labour intensive methods, can be done with quality end-results. Road construction lends itself more ideally to increasing the labour content

than most other infrastructure construction projects (Horak, et al., 1995). The various activities associated with road building projects contribute an immense amount of potential employment. It can therefore be assumed that the labour potential for cycleway and footpath construction projects are even greater.

Maintenance of these low traffic volume cycleways and footpaths tend to be ideally suited to promote labour intensive construction methods. As previously stated, contracts of longer duration are the most important contributing factor in empowering an impoverished community. Routine Road Maintenance contracts are generally of longer duration and even with high traffic volume roads, such as the Eastern and Western bypasses of Gauteng, labour intensive methods are the favoured construction method utilised.

3.2 Paradigm Shift in Design

The design of low volume road and streets differs considerably from normal street and road designs. The “design domain” concept for low volume roads implies that the use of appropriate technologies ranges between practical upper and lower limits. Very low traffic volume street construction standards tend to congregate around the lower limits of guidelines (Horak, et al., 2004). The values within this lower region of the design domain for roads are generally higher risk, probably less safe and less operationally efficient, but they are normally less costly than those in the upper region.

It is suggested that standards for cycleway and footpath design and construction should be explored to the lower side of the typical lower practical limits for very low traffic volume roads, due to the fact that the traffic loading is substantially lower, and design and construction are more suited to labour intensive processes. Consequently, the designs are dominated by considerations for environmental aspects. This implies a paradigm shift in the designs which is not currently well addressed in road design philosophies or guidelines. It implies better use of in situ materials and less costly layer work.

As stated in the introduction, cycleway and footpath provision and placement must be separated from the roadway. There should be no possible dual usage for safety reasons. It is advocated that road drainage channels and shallow swales in rural communities be placed between the road and the cycleway and footpath to ensure use by vehicles will be prevented.

3.3 Use of Local Materials

In order to maximise the labour content for cycleway and footpath construction the use of local or in situ material should be maximised. Simple yet reliable methods to classify in situ materials should be used. Normally, the in situ material is classified by means of a California Bearing Ratio (CBR) value and based on this classification additional layers are normally added to ensure that there is adequate structural strength.

The traffic loading requirements for cycleways and footpaths have been shown to be much lower than that of even a very low traffic volume road. For that reason

maximum use can be made of the in situ subgrade material with little or no additional material being required for structural strengthening. Even though much less structural strength is required, the in situ material must still be classified to ensure adequate structural strength will be provided and to provide uniform strength and support.

The Dynamic Cone Penetrometer (DCP) is an ideal instrument to be used extensively in measuring CBR values of the subgrade and whole pavement structure at field moisture conditions. The operation of the DCP is labour intensive and robust. It is an ideal instrument to be used in lieu of the traditional measurement of densities and can classify material qualities very accurately in situ. If the in situ or shaped subgrade has a DCP determined CBR of 45 and above no additional structural layer is required. If the in situ determined CBR is below 45 a base layer of 75mm will be needed.

Large sized rock, the size that one man can handle with relative ease, has been used with great success to construct road layers through the centuries. The use of dump rock, about 100mm by 125mm by 175 mm, packed on a prepared level subbase or subgrade by hand is also known as a Telford base. Smaller stones (keying stones) are placed in the openings between these hand placed dump rocks and rammed in with hammers. Protruding sharp edges are broken off by hammer in levelling the surface. Telford construction is most probably the best known in South Africa, as such constructed bases are still found in roads in the older cities throughout the country.

Even though manually taxing, Telford construction proves that strong quality road subgrades and subbases can be constructed with the minimum of initial skill required. Admittedly such a road base normally provides an uneven surface and may therefore need an additional surfacing layer to provide a smoother ride.

Telford construction can be used with success in rocky environments where such larger single sized rocks can be “harvested” by the communities. This local material sourcing is used in countries like Zimbabwe where communities are paid for stockpiles of such large single sized rocks delivered by community members at the construction site. This same size rock is often also useful in constructing gabions for retention walls and stormwater erosion protection. This is also very labour intensive and essential features for road as well as cycleway and footpath protection as the discussion on the design domain eluded to. The performance of cycleway and footpath construction is mostly dependant on protection against the environment (e.g. stormwater erosion). The crossing of wetlands and streams can be facilitated by using Reno Mattresses (typically 6x2m).

4 CONCLUSION

The Expanded Public Works Program (EPWP) has as basic objective to create jobs for poverty stricken rural communities by doing construction projects which maximize labour-intensive construction. Research has shown that such EPWP projects often do not achieve these objectives and limited actual poverty alleviation and capacity building takes place. Sustainability of job creation and the wrong level of appropriateness of the selected technologies or design standards are identified as factors leading to misalignment of objectives and accrual application.

Some of the symptoms of poverty stricken rural communities are lack of mobility and accessibility. While there is a considerable backlog of rural road provision and clear understanding that such provision not only creates short term jobs, the developmental and economic growth enablement of road infrastructure is also clearly recognised. Access to community facilities such as hospitals, schools and clinics are important considerations in the prioritisation of such projects.

Mobility and accessibility by means of cycleway and footpath provision linking such community facilities can be strongly aligned with the objectives of the EPWP as well as solving important road traffic safety problems.

The objective to increase community involvement via increased labour intensive construction technologies can be achieved in various ways. One important aspect is to make as much use as possible of local material in the construction. This enables the increase of labour content in the sourcing by means of harvesting, sorting and preparation even before construction. Design standards can be adapted to the required design paradigm and design domain for such constructed cycleways and footpaths. Large plant and machinery associated construction technologies must be excluded to enhance labour content and to lower entry barriers to community involvement on a sustained manner. Small plant and equipment usage associated with such construction techniques are however promoted.

The relaxed design and construction technologies are acknowledged to have higher risk of failure if applied for normal road construction. However, applied to cycleway and footpath construction lowers such risks considerably to practical and manageable levels. Simple and reliable construction and bearing capacity testing techniques are advocated to enhance the optimum use of local material. Basic design parameters are proposed based on such easily determined bearing capacity of in situ materials.

Lastly, it is known that maintenance activities sustain more long term jobs than just new construction endeavours alone. These labour intensive technologies are also maintenance friendly and therefore enable skill retention in communities.

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