

BUILDING A SUSTAINABLE PLATFORM FOR LOW-COST MOBILITY IN SOUTH AFRICA

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ABSTRACT

The transportation burden faced by developing rural and urban communities on a daily basis in South Africa is real and substantial. Many rural communities for example are still not connected to the main rural network or are only provided with unreliable access to socio-economic opportunities. This lack of mobility and accessibility of goods and persons has had the effect of limiting their participation in the mainstream economy thereby entrenching their isolation. No wonder this lack of access is regarded as one of the most significant determinants of poverty. The problem is not transitory, that is, given time it will pass away. Thus, the challenge for transport policies is clearly to achieve a much better level of general mobility and accessibility, at a much lower cost. Non-motorized transport modes provide that option. In this regard, the need for a concerted, deliberate and systematic effort to redress this problem cannot be over-emphasised. Making use of largely secondary data, this paper will seek to showcase as well as assess the work of the Department of Transport running the gamut from demonstration projects, workshops, design fiestas, to a non-motorized transport policy with a view to determining the gaps in the current approach in terms of type and intensity of intervention options as a departure point for crafting a much more robust implementation framework.

Key Words: *Non-motorized transport, low-cost mobility, access, poverty eradication, job creation, sustainable rural and urban development*

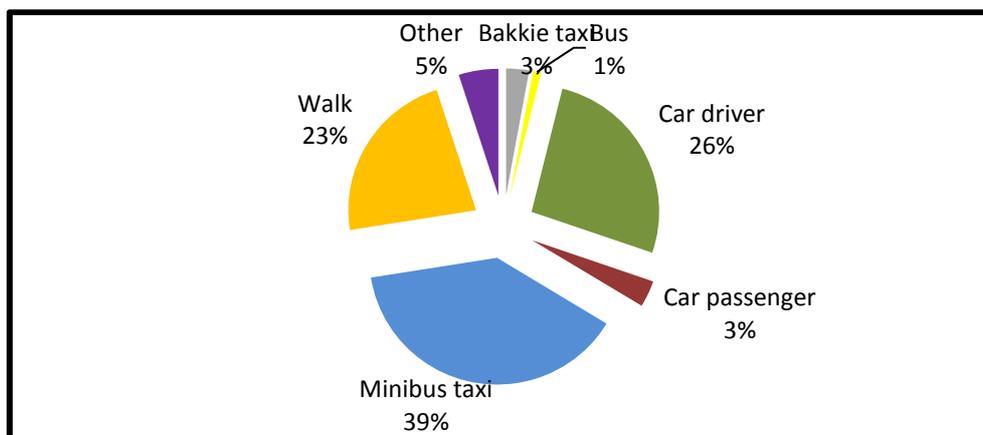
1. INTRODUCTION

1.1 Background

The challenge of transport policies for South Africa is to achieve a much better level of general mobility and accessibility, at a much lower cost (Mashiri, 2012a). Non-motorized transport (NMT) modes readily provide such an option in the sense that they are low-cost in terms of their purchase price and maintenance, provide flexible mobility, are responsive to changing demands and require low user charges. NMT modes such as wheelbarrows, bicycles, work-bikes, hand and animal-drawn carts, boats, donkeys and horses, are economically, environmentally and socially sustainable as they are often energy efficient and produce minimal air and noise pollution, improve physical access to jobs and amenities for rural and urban communities and offer entrepreneurial and income-generating possibilities. NMT modes can be used to satisfy social (visiting relatives,

funerals, weddings, church, rituals), functional (education, medical, shopping, leisure) and work-related demands (agriculture, employment, self-employment). Because of their versatility, NMT modes can be used as a collector mode feeding into minibus taxis, buses or even commuter trains.

Besides the many attributes associated with NMTs, some of which are enumerated above, their attraction also relates to their potential to provide, in part, a sustainable solution to the significant demand that exists for affordable mobility especially in developing urban and rural areas of South Africa. It is a truism to say the greater majority of South African walk to access socio-economic activities. Nowhere is this demand more apparent than in the area of learner transport. The numbers churned out by the National Household Travel Survey (DOT, 2003) are revealing: of the 13 million learners in South African schools, 73% - or a staggering 10 million learners walked to school. And, of these, 23% (3 million) walked more than 6km which often leads to fatigue in class and sometimes also leads to increased absenteeism thereby affecting education outcomes (Mashiri et al, 2009). In some rural areas of the Eastern Cape, this problem forces some parents to delay school-going for their children until they are older and more able to deal with the challenges of the journey to school (*ibid*). Given that there is a preponderance of youth in South Africa's demographic profile (SSA, 2012), the challenge is certainly growing. It is thus not an exaggeration to note that given that education is pivotal to human development and is often considered a sure pathway out of poverty, too many young South Africans' life chances are still born from the start (Mashiri et al, 2013). The majority of learners who walk average distances of over 6 km are from rural areas pointing to a much great need located in rural South Africa.



While funded learner transport exists, the demand for scholar transport far exceeds what the authorities can currently provide, for example, the Eastern Cape Department of Transport budgeted for only R210-million for 2012-13 financial years for learner transport, and yet its requirements at R400-million, are actually twice as much.

Just to amplify the point a little further this time referring to the journey to work using King Sabata Dalindyebo Local Municipality (KSD) as an example. Employing datasets from the NHTS (DOT, 2003), and as illustrated in the diagram above, in KSD, buses which enjoy subsidization were responsible for only one percent of total municipal trips. While the minibus taxi, as the most dominant mode of transport was responsible for the greater majority of trips in KSD, walking, at 23% also represented a substantial number of work trips. Irrespective of the factors contributing to a large proportion of walk trips to work (e.g. whether by choice or as a survival mechanism), it is imperative that the planning process takes this means of travel explicitly into account.

Since 1994, policy positions and research evidence have been strongly building a bankable case for a sustained low-cost mobility platform as the bedrock for improving access to socio-economic opportunities especially for developing communities (DOT, 1996; Mashiri, 1997; DoT, 2005; DOT, 2007; Chakwizira et al, 2008; Mashiri et al, 2008; DoT, 2010). However, what has not happened is indeed the follow through in terms of providing adequate funding and training to ensure that these noble policy pronouncements are successfully implemented. The apparent lack of follow-through appears to suggest that while it may be politically correct to include NMT in policy and strategy documents, it would appear that authorities are not yet fully convinced of the mode's efficacy in terms of providing a genuine solution for low-cost mobility. This gap in implementation could, in part, explain why some municipalities, for example, are relatively far ahead of others in terms of providing NMT-friendly infrastructure and encouraging NMT usage.

1.2 Purpose of the paper

This paper seeks to critically assess as well as showcase some of the work of the South African Department of Transport (DOT) running the gamut from demonstration projects, workshops, design fiestas, to a non-motorized transport policy with a view to determining the gaps in the current approach in terms of type and intensity of intervention options as a departure point for crafting a much more robust implementation framework.

1.3 Approach

The paper makes use of a case study approach tapping largely from a wealth of secondary data sources available in the public domain. In addition, discussions with experts in the field provided significant insights that enabled the generation of inflexion points for further research and discussion.

2. LITERATURE REVIEW

The transportation burden faced by developing rural and urban communities on a daily basis in South Africa is real and substantial. Many rural communities, for example, are still not connected to the main rural network or are only provided with unreliable access to socio-economic opportunities (Mashiri et al, 2012). This lack of mobility and accessibility of goods and persons has had the effect of limiting their participation in the mainstream economy thereby entrenching their isolation. No wonder this lack of access is regarded as one of the most significant determinants of poverty. The problem is not transitory, that is, given time it will pass away. Thus, the challenge for transport policies is clearly to achieve a much better level of general mobility and accessibility, at a much lower cost. Non-motorized transport modes provide that option. In this regard, the need for a concerted, deliberate and systematic effort to redress this problem cannot be over-emphasised.

As indicated elsewhere, NMTs are associated with sustainable transport. However, the prospect for the reduction in greenhouse gases (GHG) by switching from cars to non-motorized transport (NMT) such as walking and cycling is dependent on local conditions. In the Netherlands for example, where 47% of trips are made by NMT, the NMT plays a substantial role up to distances of 7.5 km and walking up to 2.5 km (Rietveld, 2001). Given that more than 30% of trips made in cars in Europe cover distances of less than 3 km and 50% are less than 5 km (European Commission, 1999), NMT could potentially influence the reduction in car use in terms of trips and, to a lesser extent, in terms of kilometres. This can lead to huge savings in terms of the country's import bill for oil. The Netherlands, with its strong policies and cultural commitment, the modal share of bicycle and walking for accessing trains from home is about 35% to 40% and 25% respectively (Rietveld, 2001).

Walking and cycling are highly sensitive to the local built environment (ECMT, 2004a; Lee & Mouden, 2006). In Denmark, where the modal share of cycling is 18%, urban planners have sought to enhance walking and cycling by shortening journey distances and providing better cycling infrastructure (Dill & Carr 2003; Page, 2005). In the UK where over 60% of people live within a 15 minute bicycle ride of a station, NMT could be increased by offering convenient, secure bicycle parking at stations and improved bicycle carriage on trains (ECMT, 2004a). Safety is an important concern regarding cyclist and pedestrian infrastructure deployment. NMT users have a much higher risk per trip of being involved in an accident than those using cars, especially in developing countries where most NMT users cannot afford to own a car (Mohan & Tiwari, 1999). Safety can be improved through traffic engineering and campaigns to educate drivers. An important co-benefit of NMT, gaining increasing currency in many countries, is in terms of improved public health (Pucher, 2004).

While NMTs play a substantial role in rural transport services in the developing world, in Africa and in South Africa in particular, save for walking, their role is not as significant. The lack of NMTs is described by the World Bank as a “missing middle” in the transportation system which renders transport services in rural areas generally ineffective. In comparison, China has close to 270 bicycles per thousand people, while Africa has just 35 per thousand. In addition, intermediate motorised vehicles, common in China and South East Asia, are not commonly found in Africa. Thus, in part, transport costs are generally much lower in Asia than in Africa. The low adoption of NMTs in most rural areas of South Africa is in part linked to availability and affordability, e.g. according to Statistics South Africa’s Income and Expenditure Survey (2005/6), the highest increases in the cost of living for the lowest quintile in the income distribution has been in the area of transport. In 1995, transport costs as a percentage of household expenditures was 4%. In 2006, it was estimated to have risen to just over 10%. This lowest quintile accounts for only 1.5% of national income. But this by itself is deceiving, as the average distorts the degree to which the mobility of poor South Africans is impaired. In the provinces of Limpopo and the Eastern Cape, transport costs constituted 16.4% and 21.5% of household expenditures in 2005/06; up from 10.7% in both areas in 2000. Whilst the potential demand for NMTs is extensive, frequently this does not translate into an effective supply due to failure of an enabling market mechanism.

3. DISCUSSION OF FINDINGS

This section presents an analysis of the roadmap to date relating to the provision of NMTs in South Africa, highlighting some implementation gaps and speculating on opportunities for improvements.

3.1 Status of NMTs in the South African society

Automobile ownership and usage are often associated with status of individuals. The flipside, which plays out most strongly in developing rural and urban communities in South Africa, associates NMT ownership and usage with poverty – even backwardness (Mashiri, 1997). In relatively affluent communities especially in urban areas, NMT modes such as cycling and walking are largely associated with recreation. This, combined with the convenience of car usage weighs up against individuals choosing to switch to NMT modes. So, without significant promotional efforts supported by substantial budgets, NMTs face an uphill task to attract significant users. Perceptions relating to accident fatalities arguably present the greatest obstacle for the successful development of NMTs especially in urban areas. In practically all urban environments, footpaths are often incomplete, non-

existent or of poor quality, forcing pedestrians to compete with motorized vehicles on the street – a competition heavily staked in favour of automobiles whose drivers often treat NMT users with disdain. Footpaths are also often cluttered with disorganised street furniture and services, and in some cases, street vendors. In addition, pedestrians and cyclists find it difficult to cross wide roads and busy intersections. Road surfaces are often strewn with debris (stones and litter) which present obstacles for cyclists and wheelchair users. Currently, many employers, educational institutions, shopping facilities and other public places do not make provision for cycle storage or shower facilities – amenities that could assist in seeking to persuade weekday commuters, for example, to switch from the convenience of using an automobile to a bicycle. Rural areas where infrastructure to accommodate even the automobile is mostly inadequate, are in a substantially worse situation.

3.2 Existing initiatives in the broader vision

As eloquently discussed elsewhere, existing initiatives to mainstream NMTs are considered inadequate largely because there is still a:

- Lack of a critical mass of NMT projects to make a significant contribution and large enough footprint to influence the trajectory of the transportation sector.
- Lack of a critical mass of NMT experts and specialists to act as technical champions to link and network with political champions in leveraging and mainstreaming NMTs as competitive transport modes, and
- Lack of dedicated or ring-fenced NMT funds to advance the goals, objectives and principles of NMTs in a sustainable manner.

As an illustration, using a component of the NMT program – the Shova Kalula National Bicycle Partnership Program, and as indicated in Table 1 below, in order to deliver on a million bicycles target (mostly procured from China and India) to provinces set for a period of ten years, DOT's strategic plan for 2007-2010 set out some relatively high but still eminently realistic and achievable targets. However, due to budgetary constraints and the capacity on the set quantity, the delivery target was revised substantially. This action was taken despite the fact that at one time, and in line with the Government's program of action (POA), the Shova Kalula program was identified as one of the key strategic focus program aligned to the War on Poverty Campaign (managed by the Office of the President) which contributed towards the then comprehensive Anti-Poverty Strategy. The spotlight here is not so much on the fact that the targets were revised, but on the magnitude of that revision, which naturally leads to questioning the level of commitment accorded the program.

Financial Year	Planned Targets	Revised Targets	As % of Planned Targets
2007 - 2008	60 000 bicycles	26 100 bicycles (2008-09)	45.5%
2008 - 2009	200 000 bicycles	15 000 bicycles (2009-10)	7.5%
2009 - 2010	500 000 bicycles	30 000 bicycles (2010-11)	6%

Table 2 presents an overview of the Shova Kalula implementation milestones across South Africa up to 2014. What is striking is that even though the program has been in existence for over ten years, the proposed numbers of bicycles to be imported and distributed is still significantly modest. At this rate, the program is unlikely ever to achieve its ultimate goal of building a low-cost mobility platform by mainstreaming bicycles in the transportation system. While funding is a stumbling block to scaling up NMT interventions, clearly there are other significant blockages that need to be tackled.

Table 2: Overview of the Shova Kalula implementation milestones					
Allocation/Province	Learners Walking More than 6 kilometres [out of 3 million]	Estimated Percentage (%)	Number of Bicycles to be Allocated		
			2011/2012	2012/2013	2013/2014
Eastern Cape	400 000	13,3 %	7 980	26 600	66 500
Free State	360 000	14 %	7 200	24 000	60 000
Gauteng	140 000	13,3 %	2 820	9 400	23 500
KwaZulu-Natal	420 000	12,7%	8 400	28 000	70 000
Limpopo	400 000	13,7%	7 980	26 600	66 500
Mpumalanga	380 000	11%	7 620	25 400	63 500
Northern Cape	330 000	12%	6 600	22 000	55 000
North West	410 000	5,3%	8 220	27 400	68 500
Western Cape	160 000	4,7%	3 180	10 600	26 500
Total	3 Million	100%	60 000	200 000	500 000

Source: DoT (Update of the Implementation of the Shova Kalula Bicycle Project, 2010)

3.3 NMT policy, legislative and institutional environment

This paper makes the argument that it is not out of the lack of policy and legislative support that NMTs have not been entrenched in the transportation sector in South Africa as illustrated by the brief discussion that follows:

- **White Paper on National Transport Policy (1996):** This watershed policy which deviated radically from past policies and underpinned not just by inclusivity, but also by focusing on an individual rather than an automobile, envisions an affordable and effective transportation system (allowing each mode to contribute in relation to its attributes) that plays a pivotal role in the socio-economic development of the country.
- **Moving South Africa (1999):** This was a high profile strategy developed to actualise the White Paper on National Transport Policy. Its departure point was the fact that South Africa has a variety of transport customers with different needs and therefore a cross-section of interventions including NMTs were required to satisfy these needs. It highlighted the fact that 80% of rural transport challenges could be resolved by studying and providing solutions for three of the nine provinces – Eastern Cape, KwaZulu-Natal and Limpopo where 69% of the rural population resided. Given that the greater majority of rural communities in these provinces walk to access socio-economic opportunities, NMTs have a massive role to play.
- **National Land Transport Strategic Framework (2002; 2006):** This framework that guides transport development in the country is explicit about the important role NMTs should play in the transportation system. For the first time, NMTs were allotted a prominent role in the transport system.
- **National Transport Master Plan (2011):** the master plan identifies NMTs as major collector mode for the public transport system, which together with freight, are considered pivotal in supporting socio-economic development.
- **National Rural Transport Strategy (2007):** It provides a suite of low-cost mobility platforms suitable for implementation in typical rural South African environments. NMTs supported by technology are central especially in terms delivering the community access bundle (access to health, education, shops, market, etc.)
- **National Land Transport Act:** It provides the legislative muscle compelling authorities to consider NMTs in their transport plans
- **Draft National NMT Policy:** It provides a comprehensive and integrated model for the development of sustainable NMT infrastructure and services in South Africa, including:
 - Promoting NMTs as key transport modes
 - Integrating NMT into public transport

- Guiding the provision of safe infrastructure and services
- Providing a funding model for provinces in promoting NMTs, and
- Articulating the responsibilities of the various stakeholders involved in the provision of NMTs.
- **Provincial Land Transport Frameworks:** They provide a framework for the development NMTs in the respective provinces. While PLTFs have chapters dedicated to NMT strategies, the results on the ground are relatively disappointing.
- **Comprehensive Integrated Transport Plans / Integrated Transport Plans:** They translate and interpret national and provincial transport vision and plans for the local context, dwelling extensively on NMTs.
- **Shova Kalulala National Bicycle Partnership Program:** Turning to DOT NMT interventions – by far the most visible and ambitious program is the Shova Kalula (ride easy) program which was initiated in 2001 as a pilot. The program recognises the role that bicycles can play especially in meeting the requirements of short trips. The primary beneficiaries are learners with no access to public transport. It is aimed at:
 - Promoting and maximizing the use of bicycles in order to enable communities to access socio-economic activities at a lower cost
 - Creating an enabling environment to mainstream bicycle transport into the public transport system, and
 - Promote cycling as a low-cost mobility solution for low-income households.

DOT's budget for the program is sometimes augmented by provincial budgets. Provinces draft business plans for the distribution of bicycles as well as setting up bicycle shops and enter into agreements with municipalities in terms of definition of roles and responsibilities in the rollout of the program. DOT then procures bicycles and distributes them to provinces as per approved business plan. While communities have welcomed this intervention, its impact is limited given the limited number of bicycles distributed which has been attributed to weak institutional development in the project areas, inadequate funding and training, the lack of NMT value chain perspective and the lack of champions especially at the local levels.

- **Atteridgeville NMT demonstration project:** It focused on employing NMTs as a collector mode for the commuter train. Lessons can be imported to current rapid transit projects across the country
- **Animal-drawn carts demonstration projects:** These pilot projects have demonstrated the efficacy of these modes for travel and transport – leading to improved productivity and spawning the manufacture, repair and servicing industry. In rural areas, it would be important to link to the rural development efforts of the Department of Rural Development and Land Reform (DRDLR) and Department of Agriculture, Forestry and Fisheries (DAFF) to augment funding and strengthening the benefits.
- **Integrated Rural Mobility & Access (IRMA) demonstration projects (2008):** IRMA projects implemented in Mpumalanga, for example, improved local circulation infrastructure for rural communities. However, transport services interventions including NMT modes were not included – representing an opportunity lost to implement a holistic program to deepen the overall impact.
- **Rea Vaya / Cape Town bus rapid transit (2010):** These two projects have demonstrated the significant demand for low-cost mobility options that are heavily supported by NMTs. Even the Gautrain (which is not low-cost) has benefited substantially from NMT-friendly infrastructure, namely, the train stations – providing a massive customer base for retailers, and by extension, influencing the growth of the tax base for the respective municipalities.

- **Design Indaba (2009):** Because of the then limited range of NMT designs in accordance with engineering, technical and environmentally approved standards, DOT, in conjunction with Design Institute South Africa (DISA), (a subdivision of the South African Bureau of Standards (SABS), commissioned the development of designs suitable for rural areas covering NMT modes such as animal-drawn carts, cycling and walking. A report covering technical designs for eight sub-categories of NMT models, specifications and user manuals to guide local manufacture was completed in 2009. While DOT is the custodian of this rich portfolio of prototype designs, there has been significant inertia observed in terms of taking this process forward.
- **Bicycle manufacture in South Africa (2011):** The study indicated that it was indeed feasible to establish bicycle manufacturing plants in South Africa with an additional objective to service the massive African market at large. This green light needs to be embraced with enthusiasm especially considering the prospect of not only building an industry in these difficult economic times, but also doing so with the knowledge that some significant numbers of jobs would be created directly and a lot more indirectly (thus responding to intersecting with dictates of the National Development Plan [NDP], the New Growth Path [NGP] and the Industrial Policy Action Plan [IPAP]).
- **Guidelines for cycling and pedestrian infrastructure and accessible infrastructure:** These design guidelines provide a toolkit for the planning, designing and implementation of bicycle, wheelchair and pedestrian infrastructure employing Universal design principles.

Clearly, DOT has at its disposal the requisite instruments and materials to ensure NMTs are mainstreamed in the transportation system. However, as indicated elsewhere, this is still to happen.

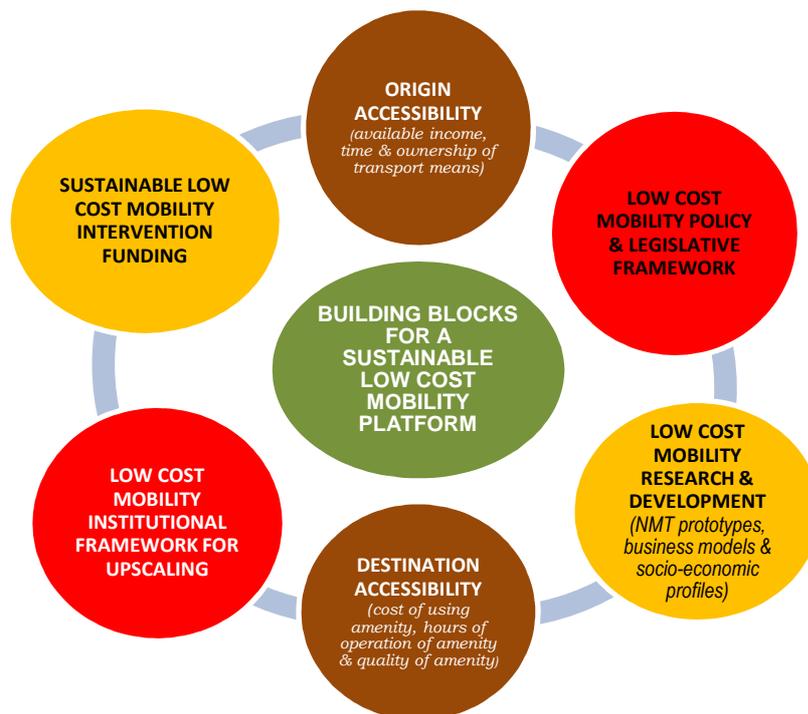
3.4 Streamlining institutional roles for enhanced NMT delivery

Table 3 presents a summary of a proposed institutional strengthening model to facilitate the delivery and mainstreaming of low-cost mobility platforms in South Africa.

Table 3: Suggested low-cost mobility delivery institutional strengthening model					
Spheres of Government			Stakeholders		
Department of Transport	Provincial Departments of Transport	Municipalities	Research Institutes & Universities	Private Sector	Civil Society & NGOs
Conduct Feasibility Studies	Needs Assessment	Political Champion	Proto-type Bicycle & other NMT infrastructure	Upscale & commercialise bicycle & other NMT technologies	Advocacy & Watchdog role Training
Analyse & Approve Business Plans	Feasibility Studies	Develop Bicycle Master Plans			
Establish Memorandum of Agreements (MOAs)	Develop Business Plans	Develop & Implement Bicycle routes Construct NMT infrastructure & services			
Institutional support & system development	Project development	Design NMT infrastructure including bicycle lanes	Impact & Evaluation Studies	Contracting & Consulting services	Advocacy & Watchdog role
Align NMT planning with other delivery mechanisms & transport modes	Coordination & system development	Provide for bicycle parking facilities & NMT facilities	Pilot & demonstration projects	Financing models e.g. PPPs in infrastructure provision	Training & Awareness Raising
Provide strategic guidance & control	Aligning Provincial plans	Redesign Traffic signals & calming measures			
Contract management	Modal integration	Integrate NMTs into transport plans			
	Infrastructure provision				

Facilitate the establishment of local bicycle manufacturing plant	Monitor distribution & deployment of Bicycles & NMT infrastructure	Regulate NMT operations	NMT & low cost mobility intelligence & fore sighting	Business Incubators	Advocacy & Watchdog role
Budgetary provision	Co-manage NMT infrastructure services including Bicycles services	Monitor NMT interventions	NMT & low cost mobility platforms scenarios & futures	Business Entrepreneurs for Bicycle & NMT infrastructure, spare parts, components, etc.	
Develop & implement demo projects	Budgetary provisions	Budgetary provision			

The institutional model in Table 3 works well where the building blocks of a low cost-mobility platform are identified, isolated and enumerated (refer to the diagram below). The four building blocks, namely, policy and legislative pillar, research and development, funding and institutional setting for implementation have a causal relationship with the origin/destination accessibility elements of the system.



Low-cost mobility platform conceptual framework

3.5 Crafting a sustainable development agenda

Climate change and environmental sustainability have become priorities on the global agenda. NMT together with public transport have a major role to play in providing a sustainable alternative to the private automobile in terms of reducing overall carbon emissions, improving air quality, reducing congestion and moving towards meeting the targets set by the Kyoto Protocol (Mashiri et al, 2013). Investment in public transport and NMT projects should be considered a priority in the master plan period to 2050, including:

- Employing spatial planning and human settlement development to encourage the use of NMT modes and public transport
- Supporting mixed and clustered pedestrian oriented land uses which present active frontages at street level in order to support accessibility and reduce trip times from origin to local amenities (a la new urbanism concepts), and
- Reducing distances for cyclists and pedestrians by increasing road and path connectivity as well as link to public transport nodes.

It is crucial to note that there is significant funding associated with the climate change agenda, which the NMT initiatives, which are currently starved of adequate funding regimes, could seek to exploit.

3.6 Aligning with and piggy-backing on anchor projects

The proposed implementation of upwards of twelve Integrated Rapid Public Transport Network (IRPTN) projects across South Africa provides a massive opportunity to introduce NMTs especially bicycles and walking on a massive scale. It will introduce new focal points, generating extensive activity and pedestrian movement. Routes feeding the station precincts could be made safe and secure and supporting infrastructure beyond the station precincts would need to be provided to ensure commuters experience a convenient, secure and seamless journey at their points of interchange. NMT parking facilities will be provided at major stations on the network.

NMT programs should be on-ramped onto strategic transportation projects either proposed or currently being implemented across the country with a view to mainstreaming NMTs. The FIFA Soccer World Cup 2010, the recent Sustainable Development Conference in Durban – COP 17, as well as the Confederation of African Football – Orange CAF showpieces provided windows of opportunity to rapidly build on what exists in terms of NMT provision employing funds associated with these major events e.g. Durban invested in excellent pedestrian infrastructure along the beach front in time for the COP 17 World Congress in 2011, whilst, for the host cities, one of the legacies of the Soccer World Cup was a network of decent NMT infrastructure.

3.7 Spatial reorganisation

It will be important for DOT to strongly support spatial reorganisation efforts at the coalface of development endeavours – municipalities, in the form of corridor development and densification of settlements around them to strengthen not only NMTs' symbiotic relationship with public transport, but also in terms of reducing the distances to access socio-economic opportunities. In the same vein, it will be crucial to reconfigure roads as "complete streets" catering seamlessly for the eight year old to 80 year inhabitant – which increases the public's sense that a community is a safe and desirable one in which to live – a perspective that tends to attract business and new jobs, and bolster the local tax base.

3.8 Intervention targeting

Acceptable walking and cycling distances vary from 1-2 km and 3-5km respectively. However, it is acknowledged that many commuters and learners walk or cycle far greater distances due to a variety of reasons chief of which are affordability considerations and the spatial dispersion of socio-economic opportunities especially in rural areas. While NMT interventions need to be mainstreamed in the long run, in the intervening period, the following groups could initially be targeted for interventions:

- Learners / scholars at school and tertiary education institutions
- Employers – develop programs to encourage staff to convert to cycling by providing facilities (showers, lockers, cycle parking) and incentives such as advance credit to purchase bicycles
- Small enterprises such as waste re-claimers and vegetable vendors with their recycling trolleys, emerging farmers (donkey/horse carts, etc.)
- Leisure and recreational cyclists with potential to become weekday commuters
- Communities located in remote and inaccessible areas of the country, and
- Persons with disabilities (PWD) and the elderly.

3.9 Creating conditions for NMT ownership and usage: Key success factors

The three main pillars determining the development of critical mass in terms of ownership and usage of NMT modes relate to (a) strengthening community involvement in project implementation given that to ensure project success, meaningful participation of beneficiary communities has become a *sine qua non* in development practice, and also, because of the scarcity of resources, the value-for-money concept demands drawing on local knowledge, insights and inputs to the planning and implementation process (b) building and maintaining a NMT value chain, particularly anchoring NMT promotion on ensuring the availability of spare parts, accessories and after-sale service, and (c) developing a robust institutional framework, providing adequate funding streams and capacity building of beneficiary communities. Table 4 below enumerates conditions for creating a critical mass for NMT ownership and usage – the bedrock for sustainability anchored on four substantive pillars, namely, socio-psychological, socio-economic infrastructural and auxiliary services.

Table 4: Creating Critical Mass Conditions For Bicycle/NMT Usage & Ownership	
Pillars	Intervention Option
Socio-psychological	<ul style="list-style-type: none"> ❑ Skills (<i>riding, simple repairs</i>) training targeting women & children ❑ Technical improvements (<i>targeting design, load-carrying capability, robust but light frames that can accommodate heavily built riders, tyres, etc.</i>) ❑ Encouragement strategies (<i>company policies, information & activities supporting bicycle commuting, e.g. contests endorsed by riding clubs, private organizations, employers</i>) ❑ Awareness programs through advertising & publicity (<i>print media, electronic media, etc.</i>) ❑ Community workshops (<i>peer influencing, role modelling, targeting the affluent & opinion makers</i>) ❑ Education & enforcement (<i>extramural school activities, community mobilization, visibility of traffic law enforcement, educational programs on traffic laws targeted at schools, drivers, the elderly & the youth & involving videotapes, pictorial books, etc., cycling training, wearing helmets, bicycle repairs, infrastructure provision, etc.</i>)
Socio-economic	<ul style="list-style-type: none"> ❑ Community-based funding schemes (incl. revolving funds) underwritten by grants ❑ Negotiation for preferential treatment from the banks ❑ Discounted interest rates / customs duties for spare parts / completely knocked down parts (CKD) ❑ Stokvel / burial society financing options ❑ Procurement / development of gender-sensitive technologies e.g. bicycles accommodating women
Infrastructural	<ul style="list-style-type: none"> ❑ Network approach to NMT infrastructure provision & ensuring cycle tracks/walkways are continuous ❑ Use of Universal design principles to provide infrastructure especially in urban areas ❑ Roadway/lane & intersection improvements to safely accommodate NMT traffic ❑ Labour-based maintenance & repair of NMT infrastructure ❑ Provision of multimodal connections ❑ Provision of bicycle parking & showers at destinations & designing safe entrances & exits ❑ Discouraging automobiles trespassing into NMT infrastructure through design e.g. bollards
Auxiliary services	<ul style="list-style-type: none"> ❑ Establishing & supporting a robust institutional framework undergirding the strategic & operational activities ❑ Identifying, constituting & nurturing SMMEs both in construction & maintenance of infrastructure as well as service provision ❑ Setting up local bicycle/NMT manufacturing / assembly plants (gradually increasing local content) ❑ Setting up repair & maintenance workshops (e.g. at a community level) ❑ Network of distributors of NMTs e.g. bicycles, spares & accessories

Source: Mashiri (1999)

4. CONCLUSION AND RECOMMENDATIONS

4.1 Concluding remarks

A community's vitality can, in part, be measured by the ease with which its inhabitants can commune in respect of socio-economic activities, including shopping, employment and schooling. By extension, a community endowed with a network of non-motorized transport facilities and a critical mass of NMT users is not just likely to prosper, but also its standard of living markedly improves. The corollary is true where it is cumbersome to access socio-economic opportunities, NMT plays second fiddle to motorized transport and transport and land use planning are undertaken with automobiles not people as the main metric. While transport policy and strategic documents reflect how NMTs have been accommodated overtime in the overall transport agenda in South Africa, clearly authorities have not gone past the psychological barrier that allows them to consider NMTs not as a "nice to have" mode (current investment in NMTs is often ad-hoc, incremental, and even disjointed) – but a mode that has the potentially to become, in association with other interventions, a solution to the demand for low-cost mobility.

4.2 Recommendations

4.2.1 Building and maintaining the NMT institutional framework

While the government has over the years been providing bicycles to learners in rural areas within the ambit of the Shova Kalula – a national bicycle partnership program, this commitment to building the critical mass required for sustained ownership and use of bicycles has not been matched with the development of the requisite institutional arrangements that guarantee sustainability. The institutional model, which has metamorphosed overtime, still needs to be fine-tuned to be more community-oriented. The program is far too focused on increasing the number of bicycles disbursed without setting aside resources to ensure sustainability in areas already served through sustained involvement of beneficiary communities.

4.2.2 Social marketing and branding, research and development

Some of the resistance to NMT ownership and usage masquerading as cultural barriers have their roots in limited exposure to the range of NMTs including a limited understanding of the benefits they often entail. NMT initiatives should thus be viewed as a holistic process incorporating raising beneficiary awareness of the intervention, engagement of stakeholders, design for the local environment and route conditions, and adoption of NMTs by those who will ultimately be using them. Thorough market research should be carried out in order to understand the needs, preferences, priorities and purchasing power/affordability of the diverse end-users groups. Clearly, the DOT needs to widely market the existing proto-types as well as seriously consider funding, on a continuous basis, research and development particularly at South Africa's universities of technology to expand the range to accommodate multiple transport needs. It would also need to co-opt prospective but powerful social partners such as organized labour and faith-based organizations to collectively promote NMTs. These initiatives could go a long way in reversing some of the negative stereotypes.

Even though it is the lower income groups whose mobility options will increase most where, for example, cyclists become generally accepted, both socially as well as in traffic, it will be crucial to market NMTs especially bicycles not as a transport mode for the poor, but as a viable alternative to automobiles given its many attributes (enumerated extensively elsewhere) as no one wants to be associated with poverty. It will thus be

necessary to widen the NMT promotion dragnet to include the relatively well-off in society largely because of the demonstration effect it has on the poor (as the poor look up to the well-off).

4.2.3 NMTs and key municipal personnel: Exploiting the demonstration effect

In order to heighten interest in NMTs, high ranking municipal politicians and officials need to be seen to practise what they preach, for example, they could initially participate in highly publicised NMT events, and later they could graduate to cycling during office hours. While these actions require significant political will, the demonstration effect that they entail, could dramatically influence the ownership, and certainly the uptake of cycling in a given municipality's inhabitants.

4.2.4 Fostering the NMT value chain

DOT needs to foster a NMT value chain perspective to ensure beneficiary communities begin to understand the potential socio-economic contribution of NMTs to society in a holistic way as well as spelling out the inflexion points for intervention. Some elements of this are already in place, albeit for the bicycle mode – they just need to be consolidated into a single powerful message.

4.2.5 Funding for NMT

One of the major stumbling blocks with regard to mainstreaming NMTs in South Africa has been the inadequate funding allocated to the program. Given the many positive attributes of NMTs including employment generating potential, the argument is made that the DOT should consider substantially increasing funding for NMTs starting with the Shova Kalula program. While funding for NMT infrastructure principally for cycling and walking as part of the rapid transit networks in the metros is recognised, it does not include funding for promotional activities and the provision of NMT modes – the assumption – which is necessarily not true, is that once the infrastructure is provided, it will be used. Overtime, it will be important for DOT to be more ambitious by carving a percentage of its budget, and allocate it to the development of NMTs in South Africa. Funding for NMTs, especially at community level also needs to come from social and private sector partners in kind or in hard currency.

4.2.6 Capacity building

Capacity building needs to be a central cog in the development of the NMT value chain. Given the enormity of the task at hand, it needs to start with building DOT capacity (in terms of increasing personnel numbers and technical know-how). Capacity building could also entail assisting with the establishment of NMT small enterprises through training and funding, as well as organizing workshops on local and international best practices to inspire beneficiary communities. Capacity building could also just mean training learners to ride and repair bicycles or explaining the finer points of a new NMT technology being introduced.

4.2.7 NMTs as social change: A game changer

In terms of the way forward to get NMTs on a higher pedestal, it will be crucial to reflect on the existing situation with an eye for a future where NMTs play a significant role in society. This requires that NMTs are seen not just as a mundane transport program but as a social change initiative – small enterprise development and improved productivity, individual health dividends, lifestyle changes, assisting with heightening spatial awareness especially for learners biking to school, engendering a caring society providing for vulnerable groups in society such as persons with disabilities, “8-80s – a society that provides an environment that accommodate persons from the age of 8 to 80” in “complete streets” (in

urban areas) and well-formed paths and access roads (in rural areas) and ultimately spawning industrial development. In this regard, it would be important to employ the “Theory of Change”, which provides a roadmap to get NMTs from the existing situation to the desired long-term goal by defining all building blocks or outcomes anchored on a pathway of change (Clark, 2012). The “Theory of Change” describes the types of interventions that bring about the outcomes depicted in the pathway of a change map and each outcome in the pathway of change is tied to an intervention.

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