FRAMEWORK FOR SUSTAINABLE WALKING AND CYCLING WITHIN THE CITY OF POLOKWANE, SOUTH AFRICA: A COMPARATIVE ASSESSMENT

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ABSTRACT

The role of Non-Motorized Transport (NMT) in meeting the daily mobility and accessibility needs particularly among the middle to low income households cannot be overemphasized. Apart from affordability reasons, the mode is fast gaining a lot of attention among transport planners, engineers and policy makers. Some reasons behind the change in ethos from heavy focus on motorized vehicular transport to NMT include environmental sustainability, rising fuel prices, traffic congestion, etc.

The City of Polokwane has over the past few years recognized the important role played by the NMT mode in meeting the transport and travel needs of the local communities. The recent local Household Travel Survey has indicated that walking is the most dominant mode in Polokwane, constituting about 52% of household modal split. The City has through the 2030 Smart City Vision and Smart Mobility Goal streamlined NMT provisioning as a critical element in redefining the way urban space is utilized. A number of strategies has since been developed with the aim of providing a safe and secure environment for walking and cycling within the city.

This paper interrogates the approach that the City of Polokwane adopted in realizing its goal. It focuses on the NMT programs that are being rolled out whose aim is to change the mindset of different road users regarding NMT, as well as creating a safe and secure environment for users. The paper further draws important comparisons between City of Polokwane's approach and experience from other cities where NMT programs have been successfully implemented. The paper largely depended on available secondary data, including NMT policies, strategies and plans of the different cities which were reviewed.

Key words: NMT, 2030 Smart Vision; Smart Mobility, Sustainability

1 INTRODUCTION AND BACKGROUND

The role being played by Non-Motorized Transport (NMT) in meeting the daily mobility and accessibility needs, particularly among the middle to low income households cannot be overemphasized. NMT utilization has seen rapid growth across cities in both developed and developing countries due to a variety of reasons including affordability, environmental, high fuel prices, congestion, recreational needs, etc. NMT includes all forms of transport which do not use an engine or motor, such as walking, cycling, rickshaws, animal drawn carts, push carts, rollerblading and skateboarding as well as associated infrastructure.

The mode is used for multiple purposes such as mobility accessibility as well as recreational and sport purposes. NMT hence plays a very important role in improving the livability and vibrancy of communities. The reputation of NMT and its recognition as a valuable component of the transportation system and the overall living environment has continued to grow, largely due to the associated multiple benefits. These benefits are cross-cutting covering environmental, health, economic, transportation (mobility and accessibility) as well as improvements in the general livability, safety and security of communities.

NMT plays a major role in the articulation of a large range of transportation needs including regional mobility and intra-neighborhood access. The mode can hence be utilized as part of or for the entire journey, as well as out of choice or necessity (captive ridership). In Polokwane the mode is commonly used for commuting (mainly work-related and educational), trips to access services such as shops and markets as well as recreational trips.

The mode is fast drawing a lot of attention among transport planners, engineers and policy makers. This research acknowledges these trends and, hence seeks to investigate and draw critical lessons regarding the approach used in the developed and developing countries. The study uses the approach and experience of Polokwane Local Municipality to draw comparisons with selected cities from the developed world where NMT has also been prioritized.

2 PROBLEM STATEMENT

Despite the important role played by NMT, the mode has only recently received the necessary attention at planning and policy levels. Most NMT initiatives and programs are retrofitted into existing systems which were never originally designed to cater for the mode’s user needs. For instance, in urban environments, road space was not designed to be shared between motorized and non-motorized modes, with engineering standards only prioritizing the former. This is even more critical where there are space restrictions which pose challenges for any initiatives to introduce NMT infrastructure. The general community mindset regarding NMT also poses a serious challenge to the acceptance of the mode in terms of hierarchy in access to road space. Therefore, NMT users continue to face safety and security challenges, largely arising from the current dearth of suitable infrastructure and institutional support systems. Polokwane Local Municipality has committed itself to the rolling out of NMT programs, under the citywide Master Plan, as guided by the 2030 Smart City

Vision. This research hence seeks to assess the Polokwane NMT approach and draw comparisons with experiences from other cities, in order to recommend areas of improvement.

3 RESEARCH AIM AND OBJECTIVES

This section of the study covers the broad aim and specific objectives which the research seeks to achieve.

3.1 Research Aim

This paper seeks to investigate the approach used by the City of Polokwane in rolling out the city-wide NMT programs and, using the experience of other cities, recommend any areas for improvement.

3.2 Research Objectives

In order to achieve the above broad aim, the study will address the following objectives:

- Explain the NMT challenges in Polokwane.
- Outline the policy environment which guide Polokwane's NMT intervention programs.
- Analyze the different NMT programs that the City of Polokwane is currently rolling out.
- Compare the NMT programs in Polokwane with those from other cities; and
- Recommend areas for improvement to enhance the success of the NMT programs in Polokwane.

4 RESEARCH METHODOLOGY

The study was based on the collection and analysis of available secondary transport data. This includes transport plans, policy documents as well as NMT program reports. It also used reports from selected cities around the world where NMT has been prioritized, to draw important comparisons and lessons which can help in improving the success of Polokwane's programs.

5 LITERATURE REVIEW

This section of the study provides a brief review of the existing research on Non-Motorized Transport in order to gain a better understanding on the concept. The discussion is based on the literature retrieved from the past research work and publications that focused on the same subject matter.

5.1 History of NMT

In the past, the urban transport needs in the Asian cities were largely satisfied by walking. Other modes were poorly developed and most cities were small and compact. Hand pulled rickshaw became the first relatively affordable alternative to walking in the last decades of the 19th century. In the beginning of the 20th century, horse-pulled vehicles offered "*taxi-like*" services in many Asian cities. Bicycles became popular in western Asia from the 1890s but were initially expensive and few

in number. However, Japan developed its own bicycle industry and the mode rapidly became very common there. (History and International Perspective, 2015).

5.2 Challenges of NMT

A study done by the Global Transport Knowledge Partnership found that NMT is one of the dominant modes of transport in the developing world. However, there is widespread lack of respect for NMT users by other roads users, particularly drivers of motorized vehicles. Currently, the designs for many traffic systems are biased towards increasing vehicular speed, and largely disregard the needs of the NMT, such as safety, accessibility, route directness, etc. Limited access to the roads network and busy streets with restricted pedestrian crossing and traffic lights makes travelling a nightmare for NMT users. Road safety is a critical issue among NMT users. The high speed and volume of trucks threatens pedestrian and cyclists on the road. In most cities, there is a lack of technical expertise to plan and design NMT facilities. (GTKP, 2015)

Transport is the fastest growing emitter of greenhouse gases in South Africa, contributing to approximately 20 percent of the country's emissions (Prinsloo, 2010). The environmental effects associated with harmful carbon emissions from motorized transport have been well documented and, hence cannot be over emphasized. These include amongst others, climate change, environmental degradation, pollution and resource depletion.

Practitioners in the built environment have acknowledged the role played by NMT in providing a cleaner and healthier alternative to the motorized mode. Many cities have come up with plans to sustainably incorporate NMT in policies, plans and programs, largely through retrofitting infrastructure within the predominantly motorized transport-oriented urban environment. However, in some cases the infrastructure-led initiatives fall short of achieving the desired short term outcomes, medium term outputs and long term impacts, as they are either poorly designed or not complemented by a supportive user-focused and driven policy and regulatory environment. Polokwane Municipality has acknowledged this anomaly and embarked on a comprehensive program which combines both NMT infrastructure and softer supportive programs. (Polokwane Integrated Urban Realm and Movement Plan, 2014).

5.3 The Rationale for Non-Motorized Transport

Increased usage of NMT has been found to have long term positive effects on the land use, car ownership patterns, urban form, infrastructure and overall quality of life. According to Börjesson and Eliasson (2012) where cycling levels are high, activities tend to cluster in cycling friendly locations.

Communities that improve Non-Motorized travel conditions often experience significant increase in NMT utilization and related reductions in vehicle usage. (PBQD 2000; Fietsberaad 2008 cited in TDM Encyclopedia 2014). As quoted in TDM Encyclopedia 2014, Cervero and Radisch (1995) explained that residents in pedestrian friendly communities walked, cycled or used transit for 49% of their work trips and 15% of their non-work trips.

In Polokwane, a recent Household Travel Survey (2014), noted that about 52 percent of all commuting trips, 10 percent of work-related trips and about 73 percent of educational trips are undertaken on foot. This picture is not peculiar to Polokwane alone but also across other cities in South Africa. This implies that any transport interventions should prioritize the NMT mode.

5.4 Interventions to Integrated Transportation

Different NMT professionals across the globe use diverse approaches and standards to accommodate NMT in the larger road network. Generally, European countries emphasize more on the importance of integrating NMT and motorized transport. Such an approach facilitates the design of more humanly-scaled road transport to travel at lower speed.

According to Börjesson and Eliasson (2012, there is potential for the NMT mode in contributing towards the reduction of congestion along most routes where traffic composition involves vehicles undertaking short trips (5km and less) and moderate length trips (15km and less). Such potential for reduction of emissions through modal shift from vehicular transport to NMT is higher in the central business district where exposure to low air quality is highest and average travelling distances are shorter. The author concur with Börjesson and Eliasson (2012) that not all car trips can be easily replaced by cycling even where they are short. Trips such as grocery shopping and ride-sharing are typical examples.

Badiani and Zazzi (2006) in their presentation cited in the Polokwane NMT Master Plan stressed the importance of understanding the different user groups and their respective needs. They also suggested that NMT networks should never be considered independently from the existing road system. As a result, issues such as the levels of integration between NMT and motorized transport should be taken into account and addressed upfront.

Polokwane NMT Master Plan quoted Lord's (2006) "top ten measures to re-introduce safer cycling". These include: better planning, people friendly engineering, traffic reduction, speed reduction, junction treatment, redistribution of the carriageway, cycle lane and tracks, cycle training, cycle access to public transport, information, publicity and encouragement. In the City of Tshwane, NMT planning was guided by critical success factors such as convenience, accessibility, safety, comfort and attractiveness. (City of Tshwane NMT Plan for BRT Lines 1 and 2: 2013).

Other factors which NMT planners should always consider include a consistent, continuous and uninterrupted network between key origin and destination points (network effect) as well as directness of routes (following shortest routes as in grid iron streetscapes).

5.5 Indicators of sustainable NMT

Sustainability is generally defined to include a variety of economic, social and environment objectives.

- *Economic impacts* include the need to address any transport bottlenecks which result in long unproductive travel time, congestions and delays. The objective is to improve on the efficiency of the transport system which in turn enhances the productivity of the traveler.
- *Environmental impacts* have to do with increasing urban density, restraining car travel and maintaining the public transport market share. The objective is to minimize the negative impact of the transportation system on the environment by reducing harmful carbon emissions.
- *Social impacts* involve improving safety, making the inner city more attractive, increasing modal choices and addressing skills gaps among transport practitioners.

5.6 Legislative Framework

The discussion below focuses on the principal legislation that govern transport planning and guide NMT planning in South Africa. The Constitution of South Africa Act 108 of 1996, assigns in Schedule 5B, the function areas of Municipal roads, traffic parking to the Municipal Sphere of Government. In accordance with this legislative requirement, all the three Spheres of Government are impacted upon by NMT, and will have to cooperate in the provision of appropriate facilities. The White Paper on National Transport Policy, 1996 supports the use of more efficient and less polluting modes of transport. It further encourages transport planners and land transport users to focus on these modes and to create awareness programs for their use. It therefore sets the stage for the promotion of NMT modes of transport where they are appropriate.

The Public Transport Policy and Action Plan, 2007 highlights the importance of NMT in the development of IRPTs. It encourages the development of strategic frameworks for NMT by local authorities, and highlights the importance of environmental designs to ensure that NMT facilities are located in pleasant and attractive environments.

The National Land Strategic Framework (NLTSF) 2006-2011 endorses and encourages the promotion of NMT for improving the mobility of people in rural areas, and the adoption of NMT to ease congestion in urban areas. The Provincial Land Transport Frameworks (PLTFs), Integrated Transport Plan, and the Climate Change Response White Paper among others, generally promotes the NMT mode because it is economically and environmental sustainable.

6 OTHER NMT EXPERIENCES

In this section, case studies from different cities are assessed. The aim is to draw comparisons and adopt strategies and assist in refining decision making processes around NMT planning. Cases that are analyzed were drawn from international, regional and national contexts. The objective of such an extensive coverage is to ascertain patterns, procedures, concepts and contexts with which NMT programs are applied and draw comparisons with the situation in the Polokwane context.

Ebert (2012) provided a comprehensive analysis of the culture of cycling in Northern Europe. Special focus was on the reasons why the Netherlands and Denmark maintained a higher level of cycling than their neighbours. In The Netherlands, cycling is mostly used for transport purposes, while in Denmark it is used for touring and in France and Italy it is predominantly used for sporting. (Ebrert, 2012; Parkin 2012).

Aldred (2012) explores the relationship between civic society and cycling and provided a historic review of the development of advocacy for cycling. She demonstrates how successive governments have "outsourced" their responsibilities for promoting cycling as transport mode. This has resulted in *"chronically underfunded"* NMT infrastructure which has left cycle users *"squeezed"* with a little space between motor traffic and pedestrians. (Aldred, 2012; Parkin 2012)

6.1 Republic of Ireland

According to the Irish Department of Transport as quoted by Lompair (2009), the percentage of employed people cycling to work fell from 7% in 1986 to 2% in 2006. The mode, however, gained policy prominence through the Dublin Bike Hire Scheme, which was oversubscribed and perceived as successful in raising the profile of cycling just in the same way as the London Bike Hire Scheme. (Lompair; 2009).

6.2 The Netherlands

Cycling in The Netherlands is very different from that of the UK and Ireland. The Netherlands has a very high level of cycling, accounting for about 26% of all journeys. (Fietsberaad 2009, cited in Aldred 2012) .The environment for cycling developed included a program of well-planned cycling networks in The Netherlands. The program was funded by tax levied on bicycles. This is in contrast to other countries such as France and Italy which did not plan their towns and cities for cycling traffic, but merely saw *"the bicycle"* as a nuisance to be separated from motor traffic. (Parkin 2012).

Most municipalities in The Netherlands have specific funding allocations for bicycle policies and infrastructure which is generated from the municipality's own budgets and subsidies from other levels of government, as well as EU funds such as parking income.

Close to half of the cycling infrastructure consists of dedicated *"cycle-only"* tracks and while the other half run along the general road network (Fietsberaad, 2009 cited in Aldred 2012). According to Parkin (2012), legislation in The Netherlands assisted to confirm the equality of status of bicycle among other road users. This has helped

in resolving conflicts between the mode and motorized traffic, thereby enabling the bicycle to permeate the society as an important mode of transport.

6.3 The United Kingdom

The approach in the United Kingdom (UK) was driven by the *"vehicular cycling"* approach. This was outlined in the UK Transport Policy with the *"Hierarchy of Provision"* initially identifying all "segregated" infrastructure as the least desired option (GfT 2008 cited in Aldred 2012). This hierarchy prioritizes traffic and speed reduction to be considered first. Although this approach yielded success in some parts of the UK, it was not wholly welcomed and has not been the best solution for London.

6.4 Columbia (Bogota)

Bogota pioneered the concept of "Ciclovia" which has in the recent years spread to other cities around the world (also known as Open Street). Every Sunday and during holidays from 6am to 2pm, the major arterial road in Bogota is shut down, banning all motorists. (Casas, 2012).

6.5 South Africa

NMT planning in South Africa is generally approached differently. For instance in Cape Town, NMT movements were largely separated from general motorized traffic. While some success was achieved, concerns were raised, particularly along Albert Road where it has become very dangerous for cyclists to cross motorized traffic lanes, especially at intersections.

In Johannesburg and Ekurhuleni, city-wide NMT planning programs are currently being rolled out. The programs, include both infrastructure and supportive user-based programs. In Ekurhuleni, shared infrastructure (walking and cycling) is promoted. In the City of Johannesburg, apart from constructing NMT infrastructure linking key nodes, focus has also been on signage and way finding to guide users. *"Critical Mass"* cycling programs are used to rally residents towards the cycling mode. In the City of Tshwane, NMT has largely been driven through programs such as the Shova Kalula, the Comprehensive Integrated Transport Plan, the Integrated Rapid Public Transport Network Strategy and Operation Plan; as well as the Bus Rapid Transit (BRT) project, etc.

7 POLOKWANE NMT APPROACH

The Polokwane Household Travel Survey (2013) noted that 52% of the total population in Polokwane walked to their respective destinations. However, there is a general dissatisfaction with the quality of infrastructure in terms of non-existence of suitable walkways and cycling lanes, safety, as well as lighting of available footpaths. Pedestrians often fall victims to crime such as robbery, pick pocketing and assaults.

The Survey further stated that existing and aspiring cyclists in Polokwane are more concerned about their security from crime, and safety from accidents. In Polokwane, there is very limited dedicated cycling infrastructure. Therefore, cyclists share road space and sidewalks with the motorized vehicles and pedestrians respectively. In

instances where sidewalks are provided for, the quality of the infrastructure is affected by obstructions from street furniture, services, and non-mountable kerbs, etc. This is evident in streets such as Suid, Grobler, Landros Mare, and Biccard amongst others, in the city centre. The discussion below focuses on plans and policies that motivate and guide NMT planning within the City of Polokwane.

The City's NMT vision captures the need for integration and for the safety of NMT users. It aims to ensure that NMT is an important aspect of an integrated transport system by stating that it aims among other things: "*to ensure that all NMT users feel safe and secure to walk and cycle and to ensure that public space is shared by all users and everyone has access to urban opportunities and mobility*"

The above vision has been drawn from the sixth pillar of the City's 2030 Smart City Vision. The six pillars of the 2030 Smart Vision are Smart Governance, Smart People, Smart Economy, Smart Environment, Smart Living, and Smart Mobility. The sixth pillar focuses on sustainable transport, under which NMT has been prioritized. The City is currently developing a NMT Policy and associated By-law which seek to address the disintegrated approach to NMT provision in Polokwane as well as the effects of apartheid spatial planning which resulted in the marginalization for some communities. In addition to the Policy and By-law, the city is also developing a city-wide NMT Master Plan. The Master Plan seeks to achieve a set of objectives which include the improvement of accessibility and social inclusion for NMT users, providing improvements in the public realm that creates a sense of place and encourages walking and cycling, improving amenity, safety and a feeling of security, contributing towards community health and wellbeing by encouraging walking and cycling as part of the daily lives of residents, employees and visitors, as well as accommodating a direct and safe NMT network and system. The NMT Master Plan provides a city-wide NMT network which outlines and guides the phasing of planning and construction of NMT infrastructure.

The City also developed a Universal Design Access Plan which advocates strongly against a *"Shared Space Concept".* The Shared Space Concept has been tried by several cities around the world, e.g. in the Netherlands and London (Methorst et al, 2007). While there are many benefits from this approach, the Universal Design Plan noted that, its application in South Africa is not sustainable due to safety and accessibility constraints, as well as challenges associated with driving behavior across South African cities.

In addition to the above plans, Polokwane acknowledges the challenges associated with infrastructure-led NMT programs. The city hence adopted a two-pronged approach which integrates infrastructure and user support programs. The latter, which include the policies and By-law explained above; as well as the NMT Ambassadorship program and the Training and Recreational Park, are being concurrently rolled out parallel to infrastructure construction.

The objective is to prepare the users to fully and sustainably utilize the infrastructure being constructed. Additionally, awareness programs, which include the establishment of a professional Polokwane Cycling Team as well as the hosting of the Annual Mayoral Cycling Race, which is registered with Cycling SA, are aimed at

addressing the stigma associated with the NMT mode and demonstrating the multiple benefits that can be derived therefrom.

8 COMPARATIVE ANALYSIS

Table 1 below outlines the comparison between the City of Polokwane and the other cities reviewed above. The comparison is drawn in terms of what actually motivates the use of NMT in these cities, what has been the approach in planning for NMT, what are the funding mechanisms and lastly look at how NMT plans have been rolled out.

Table 1: NMT experiences comparison

Cities	United Kingdom	The Netherlands	France	Ireland	Bogota	Cape Town	Polokwane	Ekurhuleni	Jo'burg
Motivation for NMT	Means of travel	Means of travel	Sport	Means of travel	Feeder into BRT	Means of travel & transport	Means of travel & transport	Means of travel & transport	Means of travel & transport
Planning approach	Corridor based	Master plan	Organic	Master plan	Master plan	Master plan	City-wide Master Plan	Master plan	Master plan
Funding mechanism	N/A	Bike tax, parking fees, public sector	N/A	Public sector	Public sector	Public sector	Public sector, private sector, donor	Public sector, private sector,	Public sector, private sector,
Roll out strategy	Holistic (infra & user programs)	Holistic (infra & user programs)	Infra-led	Infra-led	Holistic (infra & user programs)	Holistic (infra & user programs)	Holistic (infra & user programs)	Infra-led	Infra-led

9 DISCUSSION

NMT planning has been approached differently across different parts of the world. However, the prevailing objective is to prioritize pedestrian and cyclists' safety and security, which has been the main issue of concern within the City of Polokwane.

The Polokwane NMT Master Plan makes provision for allocation of a budget dedicated to NMT projects, which is a similar case in most municipalities in The Netherlands such as Amsterdam, Rotterdam, etc. The core funders for Polokwane NMT to date have been the Public Transport Infrastructure Grant (PTIG) and Neighborhood Development Partnership Grant (NDPG), the KfW Bank from Germany (through the Department of Environmental Affairs) and the United Nations Development Program's Global Environmental Fund (through the Department of Transport). Given the budget constraints, it is crucial that Polokwane increases its funding base in order to cater for the planned NMT initiatives. Currently the Municipality is engaging with private sector partners regarding funding of the NMT Training Park.

Although Polokwane did not put focus solely on infrastructure, it is not the least on the priorities as compared to “Hierarchy of provision” in cities of the United Kingdom. Rather Polokwane integrates infrastructure and user support programs.

Bearing in mind the impact that The Netherlands legislation had on NMT, Polokwane NMT Policies and Bylaws put more emphasis on the needs of pedestrians and cyclists. Although plans and policies by themselves won’t make people cycle or walk, communication with and involvement of the community are equally important. Polokwane has established a concrete base in terms of community involvement. Political heads are pioneers of the NMT campaigns and they have an upper hand in terms of changing community’s perceptions.

Bogota’s Ciclovia covers over a 100km on the major arterial, whereas Polokwane’s Proposed Church Street Transit Mall will cover approximately 2km along the City’s “Golden Mile”. Although Bogota has successfully utilized Ciclovia to engage its citizenry in owning the city, replicating the Ciclovia model might be one way of exploiting the social transformational potential of the bicycle. However, closing the major arterial in Polokwane will negatively impact on the City’s economy as motor related industry is located along Landros Mare and Market Streets.

Different NMT Classes will be implemented across different streets across the City of Polokwane, determined by traffic volume and speed. Similarly to Cape Town, Class 2 (two way segregated cycle lane) will be implemented in streets with high traffic volumes. To combat dangerous crossing at intersections, introduction of traffic calming measures are equally important.

10 CONCLUSION

In this paper, NMT challenges in Polokwane were explained and the challenges appears to be common to other cities. The policy environment which guides Polokwane’s intervention programs was outlined as well as analyzing different NMT programs being rolled out in Polokwane. From the comparison made, there is not much that Polokwane is doing that will not yield success. However, there is a need to adopt some initiatives that were successful from other cities although not using a straight jacket approach.

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