

Exploring Non-Motorized Transport As A Transport System: Lessons From Thohoyandou CBD.

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Abstract

Globally, transportation has always encouraged diversity in growth and development. Conversations have revolved on issues of current and future sustainability in the built environment. Non-motorized transport is one of the key dimensions of sustainable transportation. Exploring differentiated and nuanced understanding on how NMT support transportation sector norms and standards in respect to creating just, equitable and sustainable communities and societies is key for overall development. Sustainable provision of NMT infrastructure and services has remained a stubborn challenge for municipalities throughout South Africa. The location and quality of non-motorized transport systems plays a pivotal role in promoting sustainable flows and movement of people, goods, and services. The majority of NMT systems and infrastructure often face neglect by municipalities, are coupled with poor implementation tactics as reflected by inadequate expression in their Spatial Development Frameworks (SDFs) and lack of a critical mass of NMT projects to enhance high impact implementation of NMT projects, programmes, and activities. The paper discusses the failures and issues surrounding non-motorized transport at a local level. The paper concludes by observing the critical need for local government to rethink the concept of non-motorized transport as a sub-discipline to motorized transport.

Keywords

Non-motorized transport (NMT), Spatial Development Framework (SDF), Sustainable Transportation, Infrastructure, Municipalities

1. Introduction

Transportation plays a vital role in the day to day lives of individuals. Transport – the means by which we are mobile – comes in various modes. These include walking, cycling, cars, railways, ships and aeroplanes. These are all deeply interrelated: the increasing use of one often leads to a reduction in another (GOS 2019:8). Understanding the different forms of transportation and mainly looking at non-motorized transportation, it is key to bring forth the importance of non-motorized transport in the built environment. Non-Motorised Transport (NMT), can also be referred as “active transport”, “green transport” and transport that does not depend on engine or motor for movement (Yazid et al. 2011:126). Selala and Musakwa (2016) describe non-motorised transport (NMT) as a fully human powered transport mode. Non-motorized transport includes walking, cycling and alternatives such as wheelchair, skateboarding and rickshaw. NMT plays an important and unique role in the structure and system of providing an efficient transport system (Vanderschuren 2012:19) and is an essential element in multimodal transport chains (Rietveld 2001:2). It provides basic mobility, affordable transport, access to motorized modes, physical fitness and enjoyment (Litman, 2012:14). Most South Africans cannot afford a private motor vehicle and are dependent on either NMT trips or Public Transport (PT) trips for mobility and accessibility (Walters 2008:8). In most South Africans trips, there is at least one component of the trip that is fulfilled through NMT trips (usually walking). NMT trips, generally, act either as a feeder mode by providing access to public transport or as the

dominant mode of transport by fulfilling the entire travel need (Baufeldt 2016:1). However, despite NMT being utilized by most South Africans as a form of public transportation, (Flettermann 2008:1) explains that most of the public transportation networks in South Africa have not been (re)designed for compliance over the past three decades. In South Africa, the lack of adequate NMT infrastructure is hindering the acceptance and support of non-motorized transport (Baufeldt and Vanderschuren 2017:3). The availability of NMT plays a role in the transportation system but due to the various challenges surrounding its infrastructure, this reduces the attractiveness of selecting non-motorized transport (Beukes et al. 2012). Baufeldt (2016:2) places further emphasis that adequate understanding of NMT trips and its facilities, in order to successfully address the challenges for NMT users, are not well-established in South Africa, both in practice and on a policy level. Although NMT expressions may be finding it difficult in terms of infrastructure provision and services, NMT still remains a sustainable means of transportation. All over the world, there is an ongoing global drive to drift from motorized modes of transportation to non-motorized means of movement (Umar 2018:1). Non-Motorised Transport (NMT) is the most sustainable mode of transport, which is well recognised in academic literature (Litman 2012; Vanderschuren 2012; Baufeldt and Vanderschuren 2017). In practice, many governments have also started to appreciate the need for more NMT planning and implementation. In the developing world, however, the planning and implementation of NMT facilities is not following this world trend, or is happening at a much slower speed (Cooke et al. 2017:1). However, limited studies and grey literature under the Thulamela municipality have brought forth an inadequate understanding of non-motorized transport dynamics and dimensions in the small rural town of Thohoyandou. That being so, the researchers aimed to shed light on non-motorized transport and its existence in the transportation world.

1.1 Objectives

The study aim sought to bring forth the relevant information surrounding non-motorized transport under the local municipality of Thulamela and the function of non-motorized transport as a transport system. In order to achieve the aim of study, the following objectives were defined:

1. To assess existing information on non-motorized transport.
2. To examine the functions of non-motorized transport in the transport system of Thohoyandou, and
3. To provide recommendations on best ways to improve NMT in the Thohoyandou CBD.

2. Literature Review

Non-motorized transport is the dominant transport mode in many developing cities, especially in Asia and Africa (Pojani and Stead 2015:7791). There are numerous forms of non-motorized transport that exist. This study will look at walking as its main non-motorized transport mode to better the understanding of its role at the local level. Walking is the most common and very visible type of non-motorized transport mode in the world. Walking is seen as an important, sustainable and healthy transport mode which is utilized, daily, by large numbers of individuals. Statistic SA (2014) states that 21.1% of workers utilize walking to move, to and from work; this provides substantial health benefits for users, from the increased physical activity (Mueller et al. 2015:3). Walking is low impact and requires minimal equipment to get by and is the cheapest, low space-consuming and the most economical means of transport for short distances. Walking, hence, is the main mode of transport in most societies, rich or poor (DNNMT Policy 2008:9). Non-motorized transport allows the realization of sustainable transportation and Lois et al. (2015) states that a progressive reduction in the use of motorized vehicles and the advancement of more sustainable, alternative transport means are nowadays a crucial part of most of the policies related to transportation, worldwide. Most African countries have made a start in policy development concerning NMT (UN Environment 2016:9) based on the realization that NMT plays an important and unique role in an efficient and equitable transportation system. NMT is less understood in several cities in Africa and the poor understanding of it has led to several negative effects on its users. Poor understanding has led to poor development of the right infrastructure and planning towards NMT. The World Health Organization (2013), states that more than one fifth of the commuters killed on the world's roads, each year, are not commuting in cars but on pedestrian sections. The high number of deaths of non-motorized commuters give a glimpse into the poor understanding of essential nature of the non-motorized transport phenomenon. Not only does the safety of non-motorized commuters come into play, but the lack of well-developed non-motorized transport modes restricts mobility for development. Non-motorized transport can be used as a major element in pushing forward the ideology of sustainable movement. Traffic congestion and serious accidents are some of the constraints that affect not only the users of motorized transport but the environment. Bamney and Rastogi (2019) explain that non-motorized transport is one of the most relevant measures in solving problems in the transport system as they have been identified as being very flexible where resources are scarce. The lack in balance between motorized and non-motorized transport modes impacts transport systems and creates poor visibility for pedestrians.

Motorized transportation is the greatest global contributors to near-term atmospheric warming (Gordon 2010:21). This has led to the new need to better develop effective ways of transportation for sustainability means. Koh & Wong (2012) states that developed countries are searching for efficient and sustainable transport alternatives. As such, non-motorised transport (NMT – mainly walking) is gaining importance as a healthy and environmentally friendly transport. Understanding what NMT users consider as an “attractive commuting route” can allow planners to develop and implement appealing NMT networks and liveable areas, resulting in raised numbers of NMT utilization. However, in general, transport plans and projects ignore the existence of bicycles and pedestrians (Maciorowski and Souza 2018:125). In conventional transport planning, on foot or bicycles modes are almost always considered secondary and the quality of space for the development of these ways receives little or no attention from the public administration. One reason for this is the fact that these trips are generally underestimated in travel demand surveys. Short trips, children's travel, recreational travel, and travel to other means of transportation are often ignored in surveys (Amancio 2005:13). A systemic audit and transformation of the transport network should be performed to reduce conflicts between different transport users, and enhance trip connectivity. Special consideration shall be taken at areas of high NMT presence and activity (Victoria et al. 2012; Poyil et al. 2014). Local government has struggled in adhering to the development of diversified transport systems that provide better sustainable mobility. The Thulamela municipality is governed by frameworks, policies, plans and strategies that align its development of transportation within the municipality with the vision of the national transport master plan, 2050. Although there are several documentations around transportation in Limpopo, the Thulamela municipality is governed by a few policies, plans and legislative frameworks such as the Vhembe District Municipality Integrated Transport Plan (ITP) and the Vhembe District Traffic Congestion Strategy of 2013. These plans in place were last published in 2013 and have not been reassessed for the past 7 years to better incorporate non-motorized transport in the daily lives of the residents under the municipality. Poor institutional framework to develop and implement NMT under the municipality has caused its decline over the years and the poor sustainability of mobility in the municipality. According to Mokitimi and Vanderschuren (2017) in general, African countries have weak traffic demand policies, therefore, showing that institutional support for NMT is generally weak, as policies and government spending clearly do not promote the usage of NMT.

The lack of modal policy integration which ultimately results in transport systems which are not spatially and operationally integrated. The complex and unclear institutional arrangements and responsibilities between the various spheres of government make integration even more challenging (Walters 2012:14). A lack of structural cohesion plays a crucial role in the decline of NMT. NMT as a mode of transport requires understanding to not only develop it but to promote its several modes that can be used for sustainability enhancement under any town or city. The Local and District Municipalities plan, design, implement and maintain local NMT infrastructure as well as establish by-laws to regulate NMT activity within the municipalities. Phayane et al. (2014) explains that the local and district municipalities prepare comprehensive District and Local Integrated Transport Plans which identify the needs with respect to movement, safety, awareness and skills in relation to NMT. Part of this process involves identifying ways in which NMT can support public transport, as well as preparing a strategic approach to NMT. Poor understanding of the ground issues surrounding NMT under Thulamela from the set governmental documents such as the IDP give an indication of the lack of planning currently towards NMT which leads to unnecessary erection of basic infrastructure that does not add value in integrating NMT into the transportation system. The quick decision to provide infrastructure to cover the lack of proper design and development around NMT is usually the path municipalities pick. Vanderschuren (2012) explains that infrastructure provision is not the only requirement to improve NMT mobility. It has been observed that there is variation in perception towards impacts of improved infrastructure and its effect on travel behaviour (Jain et al. 2016:278). It is nonetheless important to note that just adding NMT infrastructure such as cycling lanes in the existing transportation system does not necessarily promote NMT usage. An understanding of NMT as a whole provides an in depth knowledge on the development of NMT in an area and guides the implementation of the facilities and specific infrastructure for the different kinds of NMT modes. The increased understanding and profile of NMT in South African municipalities can only lead to improvements in the planning and implementation of NMT.

3. Methodology

The study embraced the case study research design alongside a mixed method approach. Case studies are a detailed investigation of a small number of people to obtain understanding of a phenomenon and identify possible patterns and trends that can be generalised for a population group (De Vos et al. 2011:94). Leedy and Ormrod (2013) states that a case study is a method through which “data are gathered relative to a single individual program or event for the purpose of learning more about an unknown or poorly understood situation”. Under the case study method, an event/phenomenon is studied to learn more about it and to identify which features are most unique to the specific case. The attention of this study was centred on the Thohoyandou CBD under the Thulamela Local Municipality. Thohoyandou is a town in the Limpopo Province of South Africa. It is the administrative centre of Vhembe

District Municipality and Thulamela Local Municipality. It is situated in the eastern corner of the District. The residential areas of Block F, P-East and P-West form the boundary limits of the CBD. The CBD is accessed through R523 road, linking Thohoyandou to the other local municipalities within Vhembe District. Thohoyandou CBD is the core development node in the Thulamela Local Municipal Area. The climate in the Thohoyandou CBD is characterised by little rainfall throughout the year. The average annual rainfall is 642 mm (Luonde 2010). The incorporation of quantitative and qualitative study methodology involves practices which are interpretative. In this case, interviews, journals, articles, field notes, conversations and recordings can be used to successfully represent and interpret the material under study. One of the key methods used to gather answers for the objectives set was the questionnaire. The questionnaire method which included closed and open-ended questions was employed. Walliman (2011) states that a questionnaire can be regarded as a tool for the collection of quantitative data through (closed and open-ended) questions, although, they can also assist in qualitative data collection. The instruments used during the data collection process were matched to satisfy the study objectives set. Information was collected by processes such as direct observations and google maps. All this information is presented in detail under table 1 below.

Table 1. Data information and method collection

Type of Data	Description of data	Source	Method of collection used
Primary Data	NMT users	Site	Administering questionnaires
	Functions of NMT	Site	Direct observations and questionnaires
	Infrastructure condition assessment	Site	Direct observations and Google maps
Secondary Data	Case Study: Province, District and Local Municipality information	Internet published documents Libraries	Research and reading the published documents released by government websites.

The results were analysed in relation to the data collected from questionnaires, field observations and government information. The information acquired was cross examined through triangulation methodologies to determine reliability and validity of the approach. The outcomes of the analysis were used to develop recommendations and to draw conclusions.

4. Results and Discussion

Non-motorized transport is used for several actions in the day to day lives of individuals in the study area. The development of facilities and infrastructure that assists in NMT travel require casting a set of processes in the design phase and implementation phase. Creating a conducive built environment that promotes the utilization of various transport modes assists in diversifying the options for users which enables more investment and understanding in the different modes of NMT travel. The study conducted an online-questionnaire that gave results on the functions of NMT in the Thohoyandou CBD and the results are well documented in the figure 4.1 below.

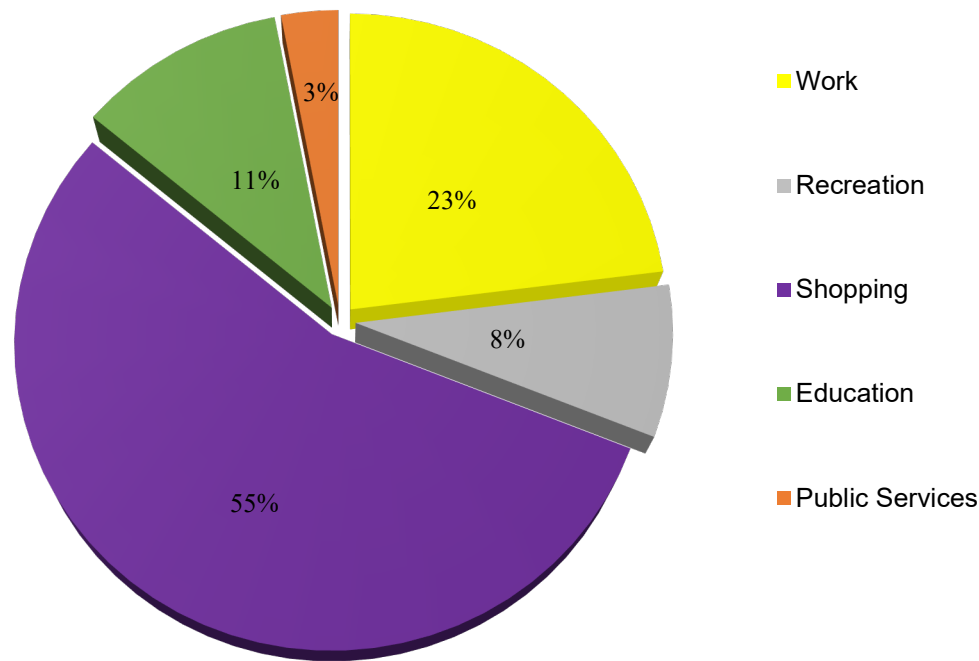


Figure 4.1: Functions of NMT (Source: Research Findings, 2021)

Figure 4.1 lays out the results of the different functions of NMT in the Thohoyandou CBD zones. Shopping was the most selected function and understandable as the CBD is packed with several business zones in all corners of its precinct. This allows for growth and development through foot traffic in addition to motorised traffic. Several participants are either daily shoppers or month-end shoppers (most individuals earn at the end of the month). The dominance in shopping shows the need for a greater development in NMT in and around the CBD as this will also improve mobility conditions for many. Work took the second highest percentage as there are many employees or employers, with some being hawkers and others running multiple business within the Thohoyandou CBD. Education came in 3rd as many learners are usually known for utilizing NMT facilities and are mostly pedestrians. Recreation and Public Services also received some responses which showed that there is foot traffic in the CBD from weekend and month-end users, for recreational and shopping activities. Public services, such as parks and rest points within the CBD are poorly utilized due to the lack of connectivity.

4.1 Work

The CBD is full of employment opportunities and many individuals are accessing the CBD for specific jobs. The current high number of unemployment has led to self-employment; many people are engaged in self-employment activities, such as selling fruits and vegetables in and around the CBD. The high percentage of work as an enabling function for the utilisation of NMT was cited as the reason for entry into and out of the CBD. This was well recorded and provides the research with a key finding regarding the NMT chain linkages to the motorised transport modes in the CBD. The trends identified around travel modes and patterns from the NHTS for 2003 and 2013 (Statistics South Africa 2013) show that: One in five workers walked all the way to work in South Africa. The majority (40.6 %) of those that walked all the way to work were not resident from an urban area. This gives evidence that NMT is key in areas which are not urban based in nature but have NMT capacity such as the Thohoyandou CBD and provides an understanding of how best NMT can be developed to counter the travel demand and characteristics of either predominantly motorised or NMT built environments.

4.2 Recreation

Recreational facilities which are placed mostly around the outer ring-road of the Thohoyandou CBD, such as the botanical gardens and Lion of Judah resort are used by individuals for several activities such as relaxing, swimming and parties. Respondents indicated knowledge of these recreational facilities but they found it difficult to arrive there safely. These recreational facilities are just a few meters away from the Thohoyandou CBD and most users usually walk to these facilities but due to the poor development of the NMT infrastructure, they tend to utilize motor-designated lanes to access these recreational facilities. The few recreational activities within the Thohoyandou CBD are rarely utilized as they are congested away from NMT infrastructure to access them. It can

be debatable that an increase in the connectivity of the transportation system concerning NMT users will allow more presence in the existing recreational zones.

4.3 Shopping

Shopping was the most selected function of NMT in the Thohoyandou CBD. This was expected as the CBD attracts consumers from every angle of the town. NMT users and a major number of students (University of Venda students are located on the South Point of the Thohoyandou CBD and are only a few kilometres away from the CBD) are more prone to utilize the CBD's existing facilities to buy products sold within the Thohoyandou CBD. In general, most shoppers from the residential areas surrounding the CBD do their shopping by walking and most students follow suit. The development of better facilities for these users will ensure shopping in the CBD increases, promote more entry points into the CBD and conveniently reduce motor traffic.

4.4 Education

Education was the 3rd highest in terms of percentages and this can be expected as there are local schools surrounding the Thohoyandou CBD and a college within the CBD, which allow for students and learners to utilize existing NMT infrastructure. The high numbers of learners utilizing the outer ring-road is very visible and they contributed to this mode for NMT usage. Accessing and utilizing the NMT on the outer ring-road raises safety issues, especially for young learners. In 2013, 81.2 % of scholars from rural areas were recorded walking all the way to school (Stats SA 2013:27). The poor infrastructure of NMT in the Thohoyandou CBD brings forth a high risk for users, more especially the young users such as the learners. Residential areas around the CBD are the key contributors to the large number of learners and college students who utilize this NMT system. Proper spatial planning and integrated development of linking systems between the residential areas and the CBD will be key towards improving NMT safety and security during various trips and journeys in the study area.

4.5 Public Services

Public services in the Thohoyandou CBD are not limited to public transportation facilities and the police station. Access to these two public services are vital for the community, thus, respondents saw NMT as an enabler or access giver to these public services for users of NMT. The lack of designated and well-constructed infrastructure linking public transportation facilities, such as bus stops (which should be a major facility around the CBD) raises concerns for pedestrians with disabilities. The lack of clear-cut designated lanes to connect NMT users to these facilities is a cause for fear among users who may require special assistance.

Summarized, the findings showcase the functions of NMT and the levels of users. This brings forth the relevant understanding of how poor legislative and policy frameworks in place to further the movement of NMT and allow for a well-developed and integrated transportation system in the Thulamela Municipality are lacking. The key functions of NMT is to assist in the growth of the Thohoyandou CBD and aligns with the aim of a progressive community in terms of transportation. NMT users are exposed to spatial constraints that affects the general movement throughout the major NMT route. Maps 5.1 and 5.2 provide a view on the major NMT routes and the spatial constraints affecting NMT users.

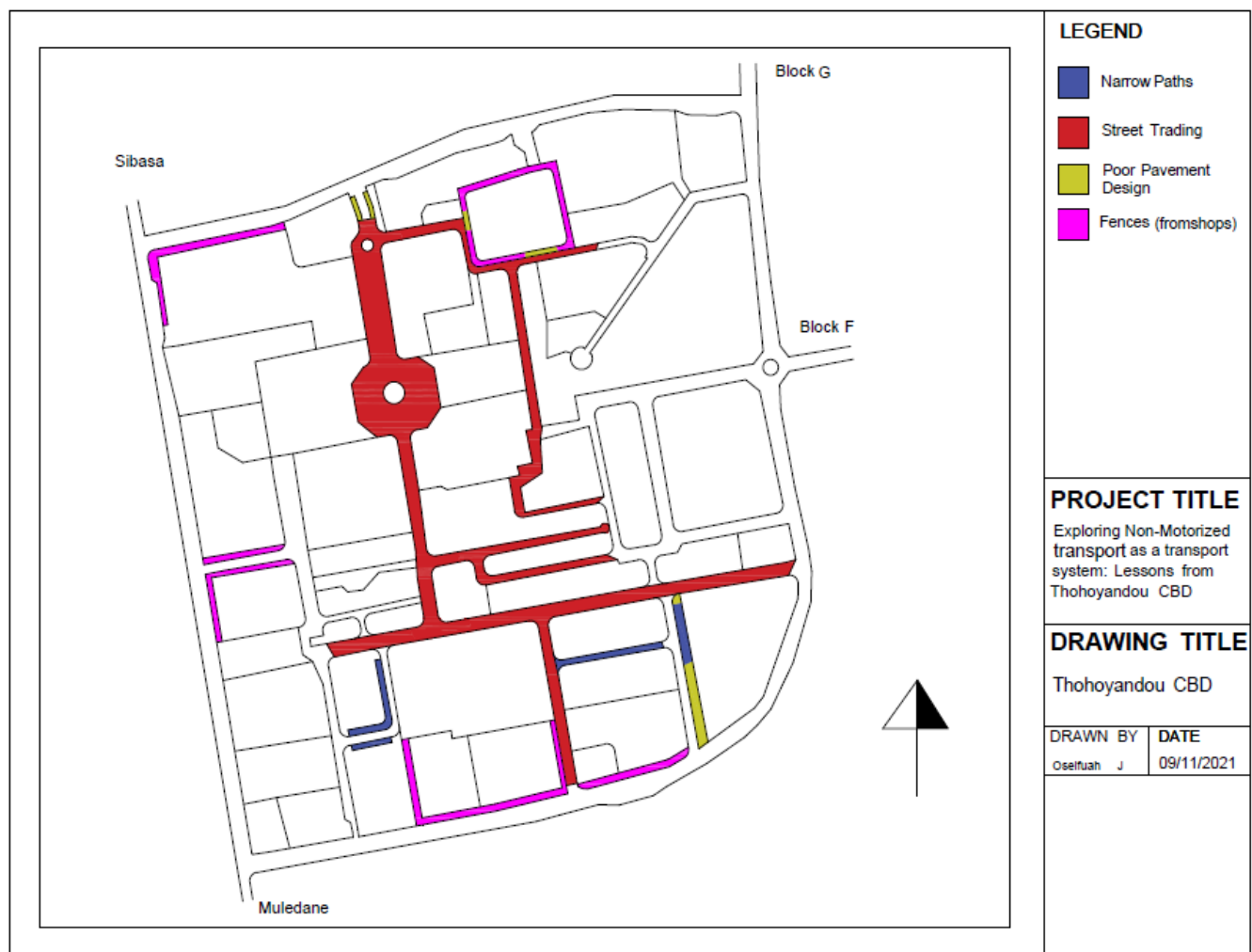
Map 4.1 NMT major routes



Source: Functions of NMT (Source: Research Findings, 2021)

Map 4.1 provides a view of the major NMT routes utilized by several NMT users in on a day to day basis. The map shows the inconsistency with the existing NMT routes and how poorly connected they are. The existing NMT network is negatively affected by spatial constraints which deter the movement of the NMT users. Map 4.2 will outline the spatial constraints in currently in place.

Map 5.2 Spatial constraints within the Thohoyandou CBD.



Map 4.2: Spatial constraints (Source: Author 2021)

Map 4.2 shows the different spatial constraints within the Thohoyandou CBD. These spatial constraints infringe on NMT lanes and limit NMT mobility throughout the Thohoyandou CBD and thus negatively affect NMT users. Exploring options that can assist in efficiently integrating NMT major routes in the existing transportation system can positively change the dynamics of NMT users.

5. Conclusion

The transportation system in the Thohoyandou CBD is not up to par in terms of creating a conducive structure to enable growth in all kinds of transportation options. The growth and usages of motorized vehicles need to be curbed with the development of alternative transportation modes. Key focus should be given to NMT modes. NMT modes can assist in instilling the element of sustainable transport and assist in alleviating the one-way traffic system in the Thohoyandou CBD. NMT infrastructure and services integration and alignment with the surrounding environments of Thulamela Municipality is evidently poor and miss-aligned with the wider town and district transportation system. Additionally, inadequate and grey literature on NMT has seemingly caused the poor development of NMT in Thohoyandou CBD despite the apparent recognition by the municipality of the importance and need to develop NMT infrastructure and services. In the study area, although fragments of poor implementation and practices in respect of standards for NMT modes were discovered, several functions of NMT act as a foundation on the 'WHY' reason NMT should be prioritised. Respondents unanimously argued for the need to have NMT being taken up high into the integrated development plan (IDP), integrated transport plan (ITP) and NMT municipal plans as a serious and important alternative and complementary mode of transportation to motorised travel that requires full development. The study concludes by recognizing the positive impact a well-developed NMT brings in the transportation system and in the quality of living for users. Enhancing the level of mobility in the CBD and ensuring sustainable movement is vital, thus reinforcing the importance of enhanced

understanding of the complementary roles that motorised transport (MT) plays in the integration and inclusion of NMT for sustainable local economic growth and development.

6. Recommendations

The paper concludes by recommending the development of a distinctive NMT policy framework for the development of sustainable NMT under the Thulamela municipality for NMT to play a major role in the transport system and growth objectives of the municipality. The study recommends that the municipality should adopt a two-part improvement plan for NMT. Part One of this NMT improvement plan will outline policies, plans and strategies for improving conditions for major NMT mode by categories (i.e., walking, cycling, skating and animal drawn transport). Part Two of this NMT improvement plan will be a compendium that provides a detailed design manual for the major identified NMT modes including any future type of NMT modes envisaged under the municipality. In addition, the revitalization of the existing non-motorized transport facilities and adequate provision of infrastructure for future users is a critical intervention area of the NMT infrastructure and services master plan. Precinct plans with full design and engineering specifications for NMT parkades, parking bays and enclosures are also necessary. Overall, the development of a supportive environment for NMT will guarantee that road safety and security, encouragement of affordable modes of NMT transport, improvement of health, or other potential benefits of NMT will be shared and enjoyed by visitors and residents of Thohoyandou town provided the NMT infrastructure and services improvement plan is budgeted for and projects are implemented in a sustainable manner.

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Biographies

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