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School of Architecture and Planning
2015

The feasibility of bicycling in moving away from the automobile-centric city

The case of Johannesburg

Dineo Lekgothoane, 608390



Declaration

I, Dineo Lekgothoane, declare that this research is my own unaided work. It is submitted to the School of Architecture and Planning, Faculty of Engineering and the Built Environment in partial fulfilment of the requirements for Bachelor of Science (with Honours) in Urban and Regional Planning degree at the University of the Witwatersrand, Johannesburg.

Dineo Lekgothoane

Date

Dedication

This thesis is dedicated to my Almighty God, Moemedi Modimo waka. Ntate I would not have made it this far without Your love, guidance, comfort, courage and patience. Kea Leboga Senatla, Morena wa Marena!

I would love to extend the dedication to my parents Doctor Matsobane Lekgothoane and Dinah Ramogohlo Lekgothoane, who worked tirelessly with the aim of ensuring that I obtain education. Ke tloga ke ikgantšha ka goba morwedi wa lena.

To my siblings, Lucky and Mogau Lekgothoane, thank you for your loving hearts and the support that you have shown me.

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- Special thanks to Boy Matsetela and the Naletsana Student Development Programme (NSDP) team for their contribution in my academic growth
- I would also love to thank everyone who participated in this study to make it a success.

Abstract

"In the 20th century, as motorization progressed, cities poured most of their investment into roads, to accommodate motorized traffic" (Godefrooijet al, 2009, p7). Automobile dependence has risen since then; contributing to problems associated with declining city centres, increases in air pollution, traffic noise and road accidents (Greene and Wegener, 1997).

Urban planners and city managers, together with politicians, are now faced with the task of reconstructing South African cities that carry the legacy of apartheid urban planning and development (Donaldson, 2001). These cities remain fragmented, and hence they continue to support a huge reliance on private car ownership.

The research deems automobile dependence as being highly unsustainable, and hence the study begins to seek alternatives. The bicycle therefore gains recognition as one of the most sustainable modes of travel. This paper seeks to delve into the feasibility of instigating a bicycling initiative in an automobile-centric city of Johannesburg. That is, while the bicycle is widely accepted as a crucial part of any urban transport strategy (GPSM, 2015), it lies within the interests of this research to weigh the pros and cons of successfully converting Johannesburg into a bicycle-friendly city.

Since the notion of sustainability forms the core of transportation policy, practice and implementation (Kamau, 2007), the study locates bicycling in the broader literature of sustainability and sustainable development. Part of the findings of the research incorporates the idea that for a bicycling initiative to be feasible in an urban setting a) there has to be a society-wide support (Wittink, 2009), and b) it must be integrated with public transport so as to allow bicyclists to have seamless journeys.

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Acronyms

BRT - Bus rapid transit

CCTV - Closed-circuit television

CoF – Corridors of Freedom

CoJ - City of Johannesburg

DoT - Department of Transport

EMWF –EcoMobility World Festival

GCR - Gauteng City-Region

GCRO – Gauteng City-Region Observatory

GDRT - Gauteng Department of Roads and Transport

GPSM - German Partnership for Sustainable Mobility

ICLEI – International Council for Local Environmental Initiatives (Local Government for Sustainability)

IDP – Integrated Development Plan

IRT - Integrated Rapid Transport

ITP – Integrated Transport Plans

JMPD - Johannesburg Metropolitan Police Department

JUCA - Joburg Urban Cyclists Association

MEC –Member of the Executive Council

MMC - Member of Mayoral Committee

NGO - Non-Governmental Organization

NMT - Non-Motorised Transport



INTRODUCTION 1

"In an urban environment, mobility is largely facilitated through road and rail networks. These networks can be likened to the arteries and veins that allow blood flow to different parts of the body. In turn, non-motorised transport infrastructure can be equated to the fine capillary networks that supply every cell with blood. The body relies on seamless integration between the arteries, veins and capillaries, and in the same way an integrated transport network is dependent on motorised and non-motorised forms of transport to ensure the effective movement of people within the urban system"

Culwick (2014, 131)

1.1. Introduction

A lack of integration between motorised and non-motorised transport in the city of Johannesburg has contributed to mobility crisis. The city now endures the environmental ills associated with a huge reliance on automobile dependence. This has led contemporary city managers to seek alternative city planning measures that can shift the car-oriented Johannesburg to a more sustainable 'people-centred' city. And one of the strategies is the City's current bicycling initiative.

The creation of bicycle lanes in a predominantly automobile-centric city thus stimulated the interests of this study. The aim of this research is therefore to measure the extent to which bicycling, as one of the most sustainable modes of transport, can be feasible in promoting this ideal 'people-centred' city.

1.2. Research topic

"The role of bicycling in moving away from the automobile-centric city: The case of Johannesburg"

1.2.1. Background and Problem Statement

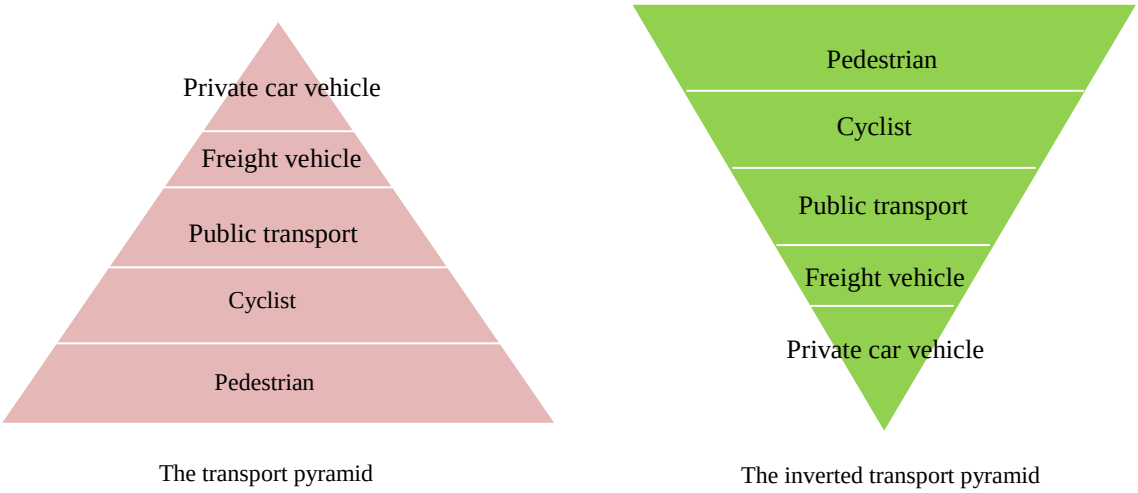
The end of the Second World War and the birth of modernist planning at the beginning of the twentieth century imposed considerable spatial transformation for most cities. During this period, the car began to dominate as the mode of individual transportation (Oosterhuis, 2014).The car contributed to the freedom of movement, as well as declining city centres, increases in air pollution and road accidents (Greene and Wegener, 1997). These adverse effects have raised some discourses in terms of sustainability, which questions the future of cities.

Urban planners and city managers, together with politicians, are faced with the task of reconstructing South African cities that carry the legacy of apartheid urban planning and development (Donaldson, 2001). These cities conform to modernist planning, which was rooted on the idea that the application scientific methods and rationality to development held the capacity to address social problems (Segooa, 2014). The outcome of this in the South African context is the highly fragmented apartheid city structure that coerces citizens to invest in private car ownership. Johannesburg is facing mobility problems that are associated with the city's built environment. The cause of this problem stems from the fact that the current city structure

continues to support automobile dominated standards, and largely neglects NMT. This has resulted in a huge reliance on automobiles – a trend that has exacerbated urban mobility crises in the city. The use of privatised vehicle transportation in a city with rapid urbanisation trends has contributed to congestion, which is in turn indicted on the basis that it contributes to an increase in greenhouse gas emissions, noise pollution, reduced mobility, lack of access and a deterioration of the inner city. Automobile dependence has thus been widely acknowledged as being highly unsustainable, hence the need for alternatives.

1.2.2. Research question and sub-questions

Although the CoJ has taken it upon themselves to work towards restructuring the apartheid city structure and to invert the transport pyramid[1] (as demonstrated by figure 1), bicycling is a relatively dangerous activity because cyclists are both not very visible and not considered as road users by motorists (CoJ, 2009).



The transport pyramid

The inverted transport pyramid

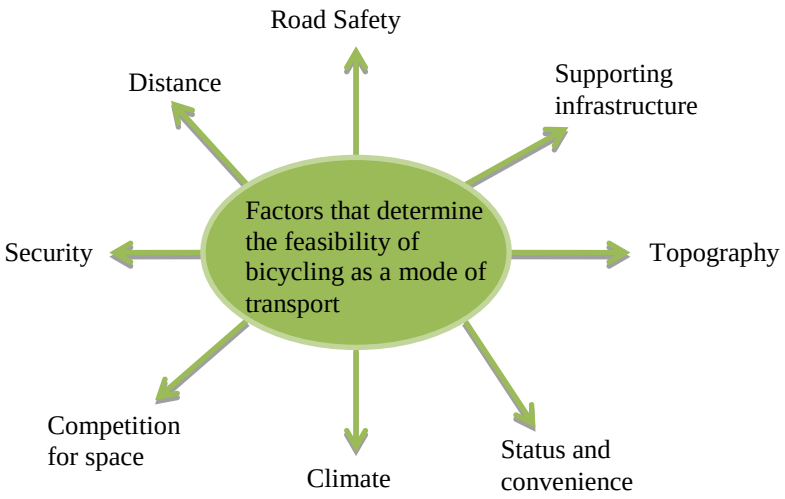
Figure 1The transport pyramid and the inverted transport pyramid

CoJ's Framework for Non-Motorised Transport (2009) reveals that cyclists make up approximately 2.5% of all deaths on South African roads. The framework also states that "The South African average in terms of the number of fatal accidents in relation to total number of bicycles on the road is 18 times higher than the world's average." (CoJ, 2009: p.6). This is one of the limitations to CoJ's current bicycling initiative and other constraints include issues around

[1]This pyramid shows different modes of transport; the one at the top of the pyramid takes priority in an urban setting. The inverted transport pyramid therefore gives priority to pedestrians and cyclists as opposed to private cars.

topography, societal perspectives, distance, security, supporting infrastructure, competition for space and climate conditions. Considering these constraints, the research begins to question the feasibility of the City's bicycling initiative. The research question is:
How feasible is the City's plan to shift towards a bicycling initiative?

The question attempts to understand the steps that are to be taken by the City to realize its goal, and the likelihood of achieving this is going to be determined with reference to the City's plan to address challenges associated with the factors listed above and also shown in the diagram below.



The following research sub-questions are going to be helpful in working towards answering the research question.

- How does bicycling contribute to the development of Johannesburg as a sustainable city?
- How far does the City think this initiative will go?
- How is the City going to encourage residents to adopt the bicycling initiative?
- What are the challenges in implementing the bicycling initiative in the City so far?
- Is it sustainable in terms of costs?

1.2.3. Rationale

Bicycling has gained recognition across the world as one of the most sustainable modes of transport. The study therefore assesses the merit of the CoJ's bicycling strategy in working towards making Johannesburg more sustainable. It is important because it holds the potential to weigh the pros and cons of initiating a NMT in a city that was predominantly designed for cars. The significance of the study lies in that it explores the importance of bicycling in urban

mobility, through making reference to other similar cases around the world. Experiences drawn and lessons that will be assimilated will help the researcher to develop an analytical lens toCoJ's bicycling approach as well as to deduce possible recommendations that may be of help in better overcoming the main constrains that threaten the successes of the bicycling initiative.

1.3. Conceptual framework

Figure 2 summarises the conceptual framework of the study.

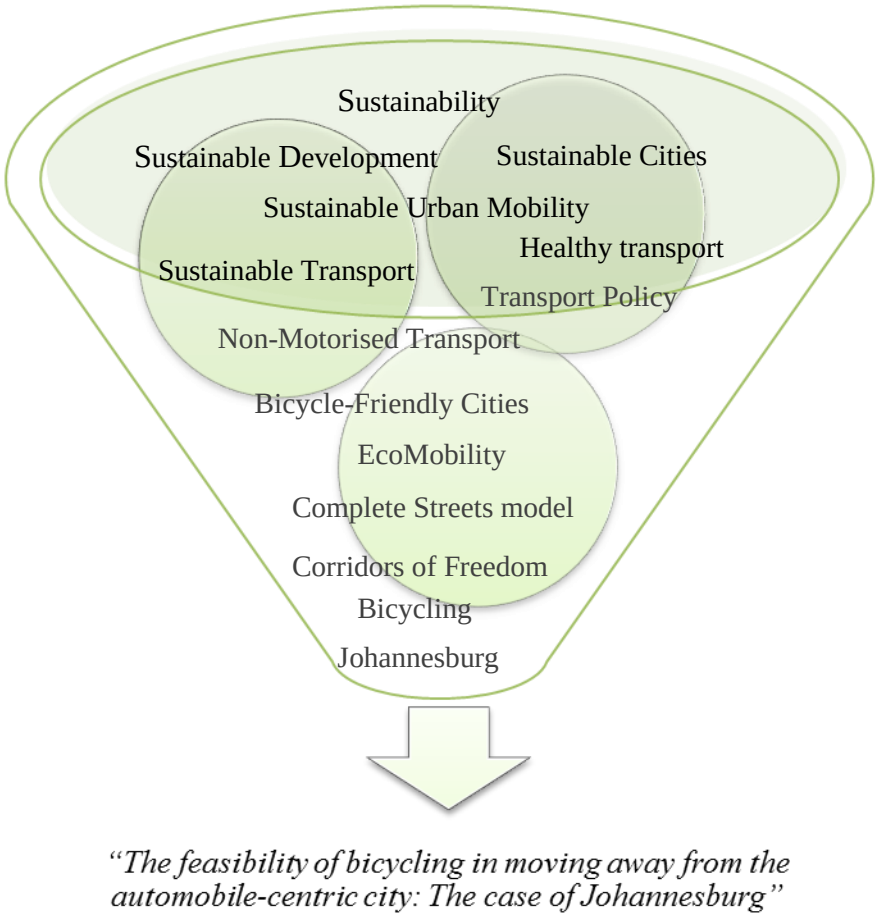


Figure 2 Conceptual framework

1.4. Research Methods

1.4.1. Introduction

The study has adopted a qualitative approach, a method which has its main focus on the interpretation of phenomena in their natural setting (Denzin and Lincoln, 1994). The aim of qualitative research is to understand of some aspects of social life (Patton and Cochran, 2002),

and hence the method was a form of interpretative inquiry that made it easier for the researcher to deduce interpretation of what was seen, heard and understood (Creswell, 2009). It was basically a form of empirical enquiry that was based on the current bicycling initiative of the CoJ. According to Bhattacherjee (2012), qualitative research bases its focus on social realities, and also draws input from human experiences and the social context. This is particularly important for the purposes of this study, as it has drawn lessons both from primary and secondary information. Secondary information in the form of government documents and the broader literature was first used, forming the basis of the questionnaire instrument which guided the interviews.

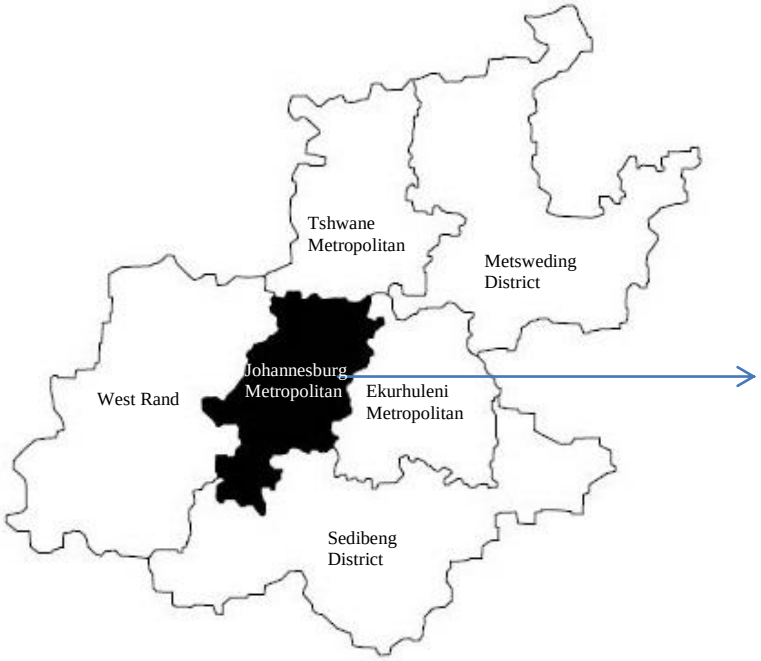
Table 1The use of primary and secondary data in analysing findings

Factors that determine the feasibility of bicycling as a mode of transport	**Primary data**	**Secondary data**
Road Safety	✓	✓
Supporting infrastructure	✓	✓
Topography	✓	✓
Status and convenience	✓	
Climate		✓
Competition for space		✓
Security	✓	✓
Distance	✓	✓

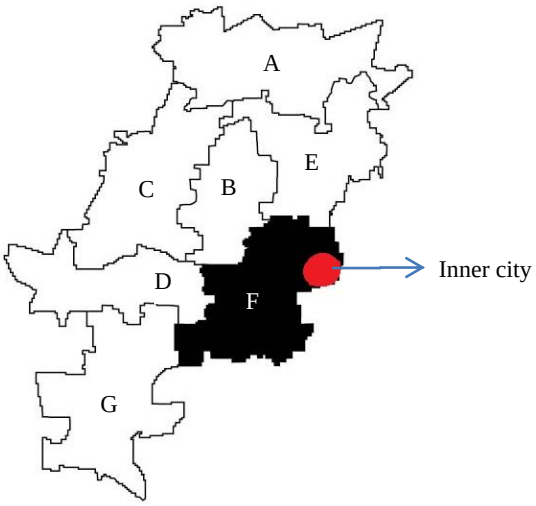
1.4.2. Case study research

In attempting to explore the feasibility of using the bicycle, as one of the most sustainable modes of transport, to move away from the automobile-centric city, the inner city of Johannesburg was selected as a study site.

Locating the study area: Inner city of Johannesburg



Map 1 Location of the city of Johannesburg in Gauteng Province



Map 2 Location of the inner city of Johannesburg in Region F

The deliberate use of a case study was important to the research as it sought to cover contextual conditions (Yin, 1994). According to Mouton (2001), the significance of using the case study method lies in the fact that it aims to make provision of an in-depth description of one or more cases. Thus, a case study tends to be useful in a study, as it investigates a contemporary phenomenon within its real-life context (Yin, 1994). Consequently, the study held the potential to explore CoJ's bicycling initiative in a meaningful way.

As suggested by Bhattacherjee (2012), a qualitative research has its focus on social realities; this study relied on primary and secondary information as means to collect data which defined the context on which the study occurred. It was in the interest of the study to provide a holistic account of the issues that were most likely to either enable or hinder the successes of the bicycling culture in Johannesburg. This was achieved through identifying and evaluating the

factors involved in the subject matter (bicycling in Johannesburg), followed by the representation of the multiple perspectives and a sketch of the picture that emerged from the findings (Creswell, 2009). The following section explains the means of data collection and begins to unpack the procedure that was followed to achieve this.

1.4.3. Data collection methods

Purposive sampling

At the beginning of the study, the researcher selected the inner city of Johannesburg as a study area because of the ongoing construction of bicycle lanes by the CoJ and a lack ofa bicycling culture within the city. Purposive sampling was used, and both primary and secondary sources of information were carefully selected by the researcher. As May (2001) suggests, purposive sampling selects the sources of information based on known characteristics (May, 2001). And for the purposes of this study, policy documents, scholarly articles and the broader literature, newspaper articles, government websites et cetera – were used first. The information obtained from these sources therefore defined the channels on which to devise interview questionnaire guidelines to attain primary information.

Secondary information

The researcher facilitated the process of data collection through examining relevant policy documents (Bogdan and Biklen, 1992). Since the case study of the research occurs in the South African context, the researcher found it necessary to make reference to *The Constitution of the Republic of South Africa 1996* as it outlines the nature of the country's government. Section 40(1) of this Constitution states that "In the Republic, government is constituted as national, provincial and local spheres of government which are distinctive, interdependent and interrelated" (The Republic of South Africa, 1996: p.25). This justified the researcher's decision to select and examine NMT policies from each sphere of government. This was important because the CoJ's bicycling initiative could not necessarily be isolated from the broader NMT agenda in South Africa. Consequently, the researcher looked at policy documents including South Africa's Draft National Non-Motorized Transport Policy, Gauteng 25 – Year Integrated Transport Master Plan, Integrated Transport Plans (ITP), and the most recent 2012/16 Integrated Development Plan entitled JOZI: A City @ Work.

Scholarly literature that relates to the research topic also formed a crucial part of secondary information. The researcher used academic journals, books and websites to review important discourses that address the topic at hand. This literature review, together with the policy documents guided the researcher to formulate a more informed questionnaire survey instrument[2] to assess the perceptions of the participants (Segooa, 2014).

In addition, the researcher also monitored[3] the use of the already existing bicycle lanes in the inner city. This boosted the understanding of the state of the city's bicycling culture. This observation was later interpreted in this report through the use of a short photo essay.

Primary information

Bogdan and Biklen (1992) refer to the natural setting in which the researcher collects data in the field through face-to-face interaction with participants. Interviews were conducted in government offices (Gauteng DoT and CoJ), Gauteng City-Region Observatory (GCRO) offices, and areas of the inner city including Hillbrow and Braamfontein where potential and commuter cyclists were interviewed. The researcher opted to interview officials from the local and provincial sphere of government as these are policy and decision makers who are responsible for the current bicycling initiative in the inner city of Johannesburg.

The second group of participants comprised city residents who tend to navigate their way through the city on a daily basis to different destinations including school, work, shops and other facilities. Most of these individuals were students who reside within the inner city of Johannesburg, as their educational institutions are located within the distance of 5km. This short distance makes them legible to make use of bicycles on a more frequent basis to school. It was crucial for the researcher to select the members of this category so as to explore their perceptions on bicycling, and the City's initiative in particular. One of the people whowere selected to boost the study was a researcher from the GCRO. Her input has added value in providing more insight on the importance of the bicycling initiative derived from relevant scholastic experience.

The primary information that was obtained from interviews was crucial for this study because qualitative methods generally seek to understand people's experiences and attitudes (Patton and

[2]Appendices C: Annexures 1 and 2
[3]Observations (during site visits) of how people use the bicycle lanes

Cochran, 2002). This was highly beneficial, as it provided the researcher with the opportunity to examine and compare the different perspectives of City officials and other stakeholders together with city residents.

The researcher was responsible for formulating interview questions and thereby ensuring that these do not rely on questions that had previously been developed by other researchers (Bogdan and Biklen, 1992).

Prior to the interviews, the researcher sent out invitations through emails, telephone calls and verbal means of communication to request potential participants to take part in the study. This process was accompanied by detailed letters briefing potential participants about what the study entails.

1.4.4. Strengths and limitations to the study

The ability of this case research to capture a rich array of contextual data was highly beneficial to the study because it enabled the researcher to derive richer, more contextualized and more authentic interpretation of Johannesburg's bicycling initiative and factors that could either hinder or make it successful (Bhattacharjee, 2012).

However, the study's samples were small, as the case study was based only in the inner city of Johannesburg. This was a disadvantage, because the findings do not necessarily represent the broader population; consequently, it was difficult to know how far the results could be generalized (Patton and Cochran, 2002). Thus, while the outcomes could reveal that it is in fact possible and feasible to facilitate a bicycling initiative in a city that is automobile-centric like Johannesburg, this position could be different in a different context.

1.5. Ethical issues

Patton and Cochran (2002) suggest that in any research project, the ethical issues relating to 'consent' and 'confidentiality' must be considered. Their thoughts are briefly highlighted below:

Consent

Patton and Cochran (2002) argued that everyone who participates in the study should have freely agreed to participate, without being coerced or unfairly pressurized. The researcher therefore had

the responsibility of ensuring that participants were well-informed about the research and what participation entailed (Patton and Cochran, 2002). The researcher also noted the importance of electronically recording interviews for future reference, and hence this had to be done with the interviewees' consent (Bhattacharjee, 2012).

Confidentiality

Patton and Cochran (2002) also emphasized the importance of protecting participants' identity. And as a result, the researcher formulated a participant information sheet that guaranteed the interviewee's confidentiality and anonymity. It was therefore the researcher's responsibility to ensure that notebooks and electronic files that captured the interviews were not to be found lying around (Patton and Cochran, 2002).

1.6. Chapter outline

While this chapter laid the foundation of the study, chapter 2 begins to delve into the topic at hand and therefore locates it in the body of scholarly literature. It seeks to unpack the discourses of sustainability relative to urban mobility and transport. Emphasis is placed on the importance of promoting healthy and stable societies, together with environments that are clean, enjoyable (Habib and Islamia, 2007) and inclusive to all categories of city inhabitants[4]. This leads to the section on sustainable cities, which suggests the creation of cities that are equitable, liveable, cost-effective, healthy, safe, and environmentally sound (New South Wales Government, 2004).

In terms of urban mobility, the chapter looks at sustainable transport on which Kamau (2007) for instance, argues that the notion of sustainability forms the core of transportation policy, practice and implementation. Sustainable transport is thus concerned with finding ways to promote NMT by increasing accessibility (European Environmental Agency, 1997). This is said to be beneficial to cities as sustainable modes of transport are found to contribute less environmental pollution and also promote social integration and inclusion of all the categories of city residents, including those who do not have access to private car usage.

The discussion then acknowledges the fact that the bicycle is increasingly gaining recognition as the most sustainable mode of transport (Marshall, and Garrick, 2011) and the focus then shifts to

[4]Including the city's most needy.

the promotion of bicycle-friendly cities. Pucher and Buehler (2008) point to the idea that bicycles cause virtually no air pollution, and also consume the least amount of non-renewable resources when compared to cars, and also that bicycle usage imposes less strain on the built environment because it requires a small fraction of space for both use and parking. This section also proposes measures that can be taken as a way of encouraging a bicycling tradition in cities.

Chapter 3 later focuses on the contextualisation of bicycling as a sustainable mode of transport in Johannesburg. The chapter commences with an overview of bicycling in the Southern African region and later in South Africa where Johannesburg is located. It also makes specific reference to South African policies that seek to promote NMT.

Greater focus is later paid to Johannesburg, as the study area of the research and the section starts by providing a snapshot of the transport landscape of the city from the 1930s to date. This historical overview is an important element of the chapter, as it seeks to stimulate the understanding of some of the factors that shaped transportation in the city.

The latter is a focus on the current bicycling initiative that is facilitated by the CoJ. It then becomes clear that the City has committed itself to sustainable development goals and part of that is to promote sustainable urban mobility. And in this, it is found that the City intends to create a sustainable urban environment with a liveable landscape that supports low-carbon economy initiatives (CoJ, undated).

Chapter 4 then seeks to delve into the City's bicycle initiative in terms of its feasibility, challenges, successes et cetera. This is achieved through making provision of an assessment of the data that are gathered through interviews, observations, visual material and so forth.

Chapter 5 later concludes by emphasizing that CoJ's bicycling initiative holds the potential to become feasible, provided that it receives a society-wide support as well as meaningful advocacy measures from the state.



LITERATURE REVIEW 2

"Cities in many parts of the world are growing rapidly. Infrastructure investment and maintenance costs are getting immense and focus on more roads for more cars must be questioned. Our cities are congested and the only way out is to plan for a modal split with a reduced share of personal automobiles."

EcoMobility World Festival Team (2015, 5)

2.1. Introduction

Prior to the emergence of the modernist paradigm at the beginning of the twentieth century, streets were multifunctional for people to walk and socialize; children to play, and car movement (Natrasony and Alexander, undated). This changed as Fordism manifested itself in the built environment. A good example lies with the Fordist principle of *specialization*, which is two-fold. First, planners were seen as trained experts who know and understand the science of urbanism and hence they were authorised to plan and formulate masterplans on behalf of the society (Natrasony and Alexander, undated).

Secondly, since mobility was essential in and around the designated land uses, street functions also became specialized (Natrasony and Alexander, undated). This came from the modernists' awareness that regular intersections delayed traffic flow. Consequently, streets were redesigned to accommodate automobiles only. Massive highway construction became important as engineers sought to provide infrastructure to accommodate the projected traffic.

The rise of automobile-centric cities promoted private car ownership as a source of liberty - *freedom of the road* (Urry, 2004). This is as a result of the car's ability to get people to different destinations at any given time. This sense of flexibility made other modes such as public transportation, walking and cycling to appear monotonous as they seldom provide seamless journeys like cars.

2.2. Problems associated with automobile - centric cities

According to Greene and Wegener (1997), automobiles have not only contributed to the freedom of movement, but also to the declining city centres, air pollution, traffic noise and road accidents[5]. The OECD (1997) also rejects motorised personal transportation on the basis that it is a source of social disruption, as it is described as being elitist, polarising and undemocratic, contributing to the loss of community and solidarity. Additionally, Peñalosa (2006) asserts that the more a city is made for motor vehicles, the less respectful of human dignity it becomes. This is due to the fact that the growth of car use took away the sense of place for communities and streets became unsafe for pedestrians and cyclists.

[5]Refer to Appendices A: Annexure 1 for other car-related urban problems

However, Jacobs (1961) rejected this critique on the basis that the ills of cities may not necessarily be blamed upon the existence of cars. She asserted that the problem lay with urban planners as they do not know how to plan for workable and vital cities anyhow – with or without automobiles. Such debates have contributed to the contemporary search for the most sustainable means to manage cities, and hence the call for the notion of sustainability.

2.3. Sustainability and sustainable development

Environmental ills associated with the presence of automobiles have imposed major constraints on modern societies. This has led to calls for sustainable development which seek to integrate social, economic and environmental sustainability (Goodland, 1995). In the report of the World Commission on Environment and Development (WCED, 1987: p 41) sustainable development is defined as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs*. In order to achieve this, two factors must be considered, these are a) to decrease consumption and change our habits and b) make use of sustainable technology to address environmental problems (Nkurunziza, 2013).

Key objectives of sustainable development include the promotion of healthy and stable societies, together with clean and enjoyable environments (Habib and Islamia, 2007). In the South African context, an example of this is evident in section 24 of the Constitution (Act 108 of 1996) which states that: '*Everyone has the right to an environment that is not harmful to their health or wellbeing*'. ICLEI also supports sustainability by connecting leaders in strategic alliances to find means to promote sustainable development worldwide (ICLEI, undated). This signifies that municipalities have a vital role to play in ensuring that their environmental policies and goals meet these objectives (Habib and Islamia, 2007).

Many European and American cities have initiated long-term programmes aimed at improving their environment, minimizing the use of resources and reducing waste (Satterthwaite, 1997). This notion of sustainable development comprises a number of building blocks and two of these are briefly discussed here. The first component is the reduction of chemical and physical hazards in the city. It acknowledges that as cities grow, it becomes essential for city managers to take measures to effectively control emissions from automobiles and waste from industries to reduce the adverse effects of climate change (Satterthwaite, 1997). This links with the second

component which is about improving the quality of the urban environment, so as to make it more pleasant and valuable to its inhabitants.

In essence, the concept of sustainability has a number of dimensions. It seeks to:

- Eliminate poverty and deprivation,
- Conserve and enhance the resource base,
- Broaden the concept of development so that it encompasses both economic growth, social and cultural development,
- Unify economics with ecology in decision making processes (Habib and Islamia, 2007).

According to the United Nations (2013), the following are some of the main challenges to the notion of sustainability on a global scale:

- The impact of climate change threatens to escalate as a result of the lack of integrated and sustainable management of natural resources.
- Rapid urbanization, particularly in developing countries necessitates the need to change the way urban developments are designed and managed.

The discourses of sustainable development have increasingly led to the idea of building 'sustainable cities' as briefly discussed in the next section.

2.4. Sustainable cities

A sustainable city is one that is equitable, liveable, cost-effective, healthy, safe, and environmentally sound (New South Wales Government, 2004). For cities to become sustainable, they need to monitor their global and local environmental impacts (European Environmental Agency, 1997). Thus, they must follow guiding principles that take into account the ecology, socio-economic conditions and meaningful environmental management strategies (Haughton and Hunter, 1994).Tabulated below are the main drivers of sustainable cities.

Table 2Main drivers of sustainable cities

	Designers	**Practitioners**	**Visionaries**	**Activists**
Orientation	Architects, planners, consultants, and related professionals	Politicians, local government, citizens and community organizations	Agriculturalists, economists, architects, planning theorists, appropriate technologists	Writers, community activists, bioregionalists, social ecologists and other environmentalists
Focus	New developments	Existing settlements, municipalities	Communities of association and interest, as well as of place	Human scale, sustainable settlements based on ecological balance, community self-reliance and participatory democracy
Means	Reducing urban sprawl, design to encourage the revival of public life (e.g. townscapes, streetscapes, malls and squares)	Local initiatives to create local sustainable development action strategies	Reducing resource waste energy efficiency, stressing passive solar heating and cooling, encouraging local food production and reliance on local resources fostering creation of on-site jobs and neighbourhood stores to revitalize communities and eliminate wasteful commuting	Decentralized, grass roots, cooperative development

Source: adapted from European Environmental Agency (1997).

Many studies on sustainable cities agree that one of the areas that require structural reform is mobility management (European Environmental Agency, 1997). This links to calls for sustainable transportation.

2.5. Sustainable transport

According to Kamau (2007), it has become impossible to address any transportation issues without considering the concept of 'sustainable transport'. He perceives the notion of sustainability as forming the core of transportation policy, practice and implementation across the world. A sustainable transport system is described by Williamson (2005: p4) as "one in which fuel consumption, emissions, safety, congestion and social and economic access are of such levels that they can be sustained into the indefinite future without causing great or irreparable harm to future generations…". This encompasses finding means to integrate and promote public transport, cycling and walking by increasing accessibility (European

Environmental Agency, 1997).The function of urban transport is to link residence with work places, as well as producers and sellers of goods and services (Rahim, 2014).

The OECD (1997) suggests some key sustainable transportation principles that are essential in the process of working towards making sustainable transport possible and these are tabulated below in Table 3.

Table 3 Sustainable Transportation Principles

PRINCIPLE	DESCRIPTION
Access	People must have reasonable access to places, goods and services, and information that empowers them towards sustainable transportation.
Equity	Sustainable transportation must be inclusive to all members of the society including women, the poor, the rural, and the disabled.
Individual and Community Responsibility	Everyone in the community has a responsibility of making sustainable choices of personal mobility and consumption.
Education and Public Participation	It is important to include the public in the decision-making process concerning sustainable transportation.
Integrated Planning	Decision makers must adopt a more integrated approach to transport planning.
Pollution Prevention	Meeting transportation needs without generating emissions that are hazardous to public health and global climate.
Economic Well-Being	Economic policies should support sustainable transportation as it contributes to the improvements in economic wellbeing.

Source: adapted from the OECD (1997)

It is clear from the principles that the process of achieving sustainable transportation requires a comprehensive approach that incorporates governance, land-use planning, economics, and equity (OECD, 1997).

According to Buehler and Pucher (2011), processes of achieving sustainable transportation are often hindered by a number of barriers, including institutional inertia, fractured institutional responsibilities and lack of cooperation, financial constraints, and public resistance to culture and lifestyle changes. Another barrier is the idea that reducing automobile mobility may result in a decline of the vehicle and fuel production industries and their associated activities (OECD, 1997).

Moody (2012) asserts that for sustainable transportation to be achieved, authorities must have a well-coordinated and consistent policy implementation with regards to developing infrastructure, taxation and land-use regulation.

According to Oosterhuis (2014), the car became a dominant mode of transport after the Second World War, and the fight against the 'car-only' nature of cities began to gain momentum in the urban space since the 1970s (Sustainable Mobility, 2011). This gave recognition to NMTand public transport as the most sustainable modes of transportation.

2.6. Non – Motorised Transport

According to DoT (2008) NMT refers to forms of transport that are human-powered such as walking, cycling, skateboarding, as well as animal powered travel. As a valuable component of mobility, NMT - also referred to as 'Active Transport' (Pardo, undated) forms the most basic part of the transportation system because of its benefits including increased access, improvements in health and quality of life, vibrancy in the street environment and environmental benefits such as the reduction of transport emissions (CoJ, 2009). NMT is also recognised as a feeder system to all the systems of public transport (GDRT, 2013). It is therefore commonly found that cities ranking at the top of surveys that measure urban quality of life have high quality urban transport systems that prioritise NMT and public transport (Pardo, undated).

Culwick (2014) asserts that research and planning tends to pay greater attention to pedestrians and cyclists, as these categories form the largest proportion of NMT users in cities. This happens because walking and cycling represent a real alternative to automobile dependence (European Communities, 2007).

Most city managers and planners across the world have begun to work towards finding means to promote NMT. This has been supported through a number of policy reforms, infrastructure developments and social campaigns that seek to promote a shift away from automobile dependence (Culwick, 2014). Part of this was recognition of making use of the bicycle as one of the most sustainable modes of transport. This has contributed to discourses around creating 'bicycle-friendly cities'. The following section briefly elaborates on this topic.

2.7. Bicycle-Friendly Cities

The bicycle is increasingly gaining recognition as the most sustainable mode of transport (Marshall, and Garrick, 2011). Copenhagen's success at maintaining a high percentage of bicycle traffic was enhanced by the presence of a bicycling culture, which is seen as a crucial element in creating a bicycle-friendly city (Nelson and Scholar, 2007). For city planners to change the

culture of transportation, they need a critical mass[6], and to achieve this they are required to create a bicycling environment that is safe, comfortable and secure for everyone (Nelson and Scholar, 2007).

Designing for lower vehicle speeds is an important measure in restoring the balance between people and vehicles (Hamilton-Baillie; 2008). Copenhagen transport planners make use of dual techniques to promote cycling. These are soft policies in the form of educational campaigns to encourage new bicyclists and influence change in transportation behaviour, and hard policies such as creating cycling infrastructure which also has a great impact in stimulating the bicycling culture (Jensen, 2000).

Pucher and Buehler (2008) assert that bicycles cause virtually no air pollution, and also consume the least amount of non-renewable resources when compared to motor vehicles. They argue that as a mode of transport, bicycles are more beneficial because the only energy that is required from cyclists generates valuable cardiovascular exercise. Moreover, they also highlight that bicycle usage imposes less strain on the built environment because it requires a small fraction of space for both use and parking. Nkurunziza (2013) supports this by highlighting the importance of bicycles in social inclusion, particularly in developing countries. He mentions that it is a cheap vehicle, more affordable and often cheaper than public transportation. Furthermore, Kim and Dumitrescu (2010) acknowledge that while roads enable social and economic development, this comes at a greater cost. Therefore, they believe that an inclusion of NMT in road infrastructure investments will lead to more benefits as environmental and socio-economic costs of road building will be minimized.

2.8. Some determinants of bicycle use

Cycling for utilitarian purposes is often influenced by a number of determinants (Heinen et al., 2010) including the natural environment, the built form and psychological factors.

Natural environment

Natural conditions such as weather and geography affect bicycle use (Oosterhuis, 2014). Listed below are some examples of such factors:

[6] For example, the critical mass of bicyclists in Copenhagen means fewer cars and increased motorists' awareness of bicyclists (Nelson and Scholar, 2007).

- *Hilliness and Landscape* – slopes have a negative impact on cycling as they tend to increase the effort that must be made by cyclists,
- *The Seasons and Climate*–Different seasons affect cycling trends in different ways depending on varying contexts. Rainy seasons hinder people from engaging in cycling activities (Heinen et al., 2010).

Built form

Heinen et al. (2010) refer to the relation between the environment and travel behaviour, and the main points are tabulated in Table 4.

Table 4The relationship between the environment (built form) and travel behaviour

Example	**Explanation**
Urban Form	Distance is taken into consideration when an individual makes a decision on whether to cycle or not. As a result, the dispersed urban form associated with increased distances may discourage a cyclist from opting for the bicycle as a mode of transport due to the increased time and effort required for travelling.
The network layout	Dense road structures are more suitable for NMT because of reduced distances.
Infrastructure	Provision of adequate bicycling facilities is most likely to encourage people to engage in cycling.
Facilities at work	Availability of bicycling facilities in the workplaces could encourage people to commute to work using bicycles

Source adapted from Heinen et al. (2010)

Psychological Factors

Attitudes and Social Norms – People's perceptions of the advantages and disadvantages of bicycling are mainly influenced by societal attitudes and biking habits (Oosterhuis, 2014). In essence, for the bicycle to gain greater use, a number of beliefs or myths must be overcome, in order to change societal perceptions (Waal, undated). These beliefs include: a)the car is generally perceived as an icon that symbolises capitalism (Rahim, 2014), b)the idea that bicycles are for the poor, and c) the status in life that one has advanced once they move from owning a bicycle to a motor vehicle (Waal, undated).

2.9. Making Cycling Safe and Convenient for all city occupants

Travel behaviour studies reveal that people's choices of transport mode are largely dependent on what provides them with the greatest utility (Handy, 2006).That is, most people prefer cars over NMT, because cars are more convenient and more comfortable. Nelson and Scholar (2007) therefore argue that if bicycles are to compete with cars, their utility must be greater. And the

only way to achieve this would be through making driving more expensive (introducing taxes and parking fees) and providing infrastructure to support bicycling. Thus, cycling will be more viable if it becomes more advantageous than driving a motor vehicle. Such a process of promoting a cycling culture may be supported by some other measures and strategies highlighted below.

Provision of bicycle lanes and parking

Pucher and Buehler (2008) denote that making provision of separate facilities such as bicycle lanes expanded greatly from the mid-1970s to the mid-1990s, as this formed the basis for the Dutch, Danish, and German policies to make cycling safe and attractive. They also highlight that these are designed to cater for a diversity of bicyclists, including women and children, to feel safe and comfortable. These have proven to encourage people to embark on bicycle journeys. A lack of these may contribute to potential cyclists refraining from opting for bicycles as modes of transport (Dumitrescu, 2010).It is important that these bicycle facilities must be designed in such a way that they are *legible*, that is, bicycle lanes are easily identifiable because a clear image enables the cyclist to move easily and quickly (Lynch, 1960).

The provision of these lanes must be accompanied by bike parking areas, which must be created, preferably following the 'design principles for bicycle parking facilities', and these are:

"1. Open and attractive facilities in easily supervised places that feel safe and nonthreatening, with good passive surveillance to deter acts of vandalism and theft
2. As close as possible to building entrances (preferably within 25m)
3. Relates to the travel requirements of the user, e.g. lockers for commuters and racks for short-term use"

(New South Wales Government, 2004: p49).

Drawing from the Dutch, Danish and German experience, bike parking can be aligned with public transport as this does not only enable bicycling to play its role asafeeder and distributor service for public transportation, but also allows cyclists to have seamless journeys (Pucher and Buehler, 2008).

Rules of the Road

- Cyclists are thought of as 'soft cars' in Denmark, and must follow the same rules as vehicles
- No right turns are allowed on red lights for either cars or bicycles
- Cyclists are permitted to ride two-ways on one-way streets where signage is posted
- Children can cycle on the footpath until the age of six
- Children over five cannot be a passenger on bicycle
- Cycling side-by-side is permitted unless someone wishes to pass
- Mopeds must travel 30 kilometres per hour or less on the cycle paths
- One hand must be on the handlebars at all times
- Left turns are allowed only indirectly, by first crossing the intersection and then crossing again
- Cyclists must use hand signals to indicate turns
- At areas with a separate bus island, bus patrons must wait for bicyclists to pass; in areas where patrons exit and enter directly onto the cycle tracks, bicyclists must yield the right-of-way
- It is not permitted to ride on pedestrian-only street, crosswalks, or on the sidewalk
- Lights must be used at night

Figure 3 regulatory measures that can be taken to achieve bicycle-friendly cities (adopted from: Nelson and Scholar, 2007).

Signage on road intersections

According to Lowe (1990) road intersections are the most dangerous areas as this is where non-motorized traffic and motor vehicles cross paths. Road safety must therefore be ensured by putting signage including advanced green traffic signals on road intersections where cyclists and motorists converge, as this places emphasis on the fact that motorists are not the only road users (Pucher and Buehler, 2008). Signage thus provides cyclists with a sense of *identity and control* where they too feel that some part of the environment (cycling space on the road) belongs to them (Carmona, et al., 2003).

Traffic laws

Policies are also essential in making cycling safe and feasible for city dwellers (Pucher and Buehler, 2008). They serve as regulatory measures that seek to make the road liveable. *Liveability* is achieved when all road users are relatively comfortable (Carmona, et al., 2003). And *comfortability* is realized when the environment is secure, safe and attractive (New South Wales Government, 2004).

Figure 3 is an example of such regulatory measures that seek to promote cycling in cities. One of the rules that make cycling more advantageous than driving a motor vehicle is the idea of allowing cyclists to travel two-ways on one-way streets (Nelson and Scholar, 2007). This demonstrates that it is possible to make cycling more competitive.

In addition, Waal (undated) points to the bicycle demonstration projects that were carried out in some areas of Pretoria, Randburg and Cape Town in South Africa. He derives lessons learnt from the projects, and argues that these can make a meaningful contribution to the process of making bicycling safe and convenient. These are:

Bicycle path networks must be continuous - This helps cyclists not to be left to find their own way to the next bicycle path.

Maintenance of bicycle lanes – He asserts that it is important to note that bicycles do not 'sweep' roads like motor vehicles. And as a result, the lanes need to be well maintained for the ease of bicycle mobility.

Traffic enforcement – This must incorporate regulatory measures to prevent motor vehicles from stopping or parking on bicycle lanes.

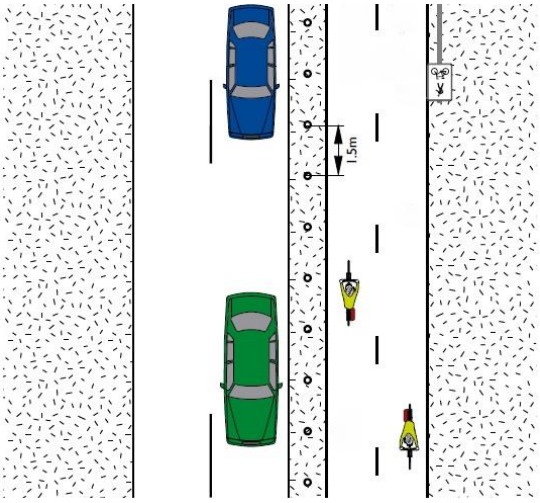


Figure 4 Example of the use of bollards to prevent illegal parking (New South Wales Roads and Traffic Authority, 2005).

Illegal vehicle parking on bicycle lanes often occurs in heavily populated cities and towns where there is a very high demand for on-street parking (New South Wales Roads and Traffic Authority, 2005). This blocks bicycle traffic movement and also threatens cyclists' safety on the road. New South Wales Roads and Traffic Authority (2005) therefore suggest physical methods (such as the use of bollards)[7] to prevent illegal parking, and figure 4 demonstrates this.

Despite all those benefits, bicycling as a mode of transportation is still a major challenge for most cities around the world (Nkurunziza, 2013). Some disadvantages of bicycle usage include the fact that bicycling is a slower mode of travel compared to motorised transport and it is difficult to carry loads while cycling (Heinen et al., 2010).

[7] Note: it comes highly recommended that bollards should not be used when there is moderate to high pedestrian activity (Roads and Traffic Authority, 2005).

Case Study 1: Cicloviá - Bogotá, Columbia

Unlike the cities of the developed world like Copenhagen, the relatively poor city of Bogotá succeeded in implementing a sustainable transport policy and practice (Moody, 2012). Bogotá is highly populated with a population of 7 million inhabitants and about 230 inhabitants per hectare (Wright and Montezuma, 2004) and only 15% of the city's population have access to a private car vehicle (Moody, 2012).



Figure 5Some NMT activities on Cicloviá (Moody, 2012).

The city's initial plan was to change the transport system and quality of the public realm, and part of this was to expand the Cicloviá network[8] (Wright and Montezuma, 2004). Cicloviá are roads that are closed every Sunday, on public holidays and special occasions creating space for pedestrian mobility, cycling activities and street trading (Moody, 2012). The process commenced in 1982 (Wright & Montezuma, 2004) and now benefits about 1.5 million people, as social interaction is enhanced in a city beset with crime and inequality (Moody, 2012). Cycling has been promoted through the provision of about 300km of protected bicycle lanes, and these have largely boosted the bicycling culture (Peñalosa, 2006).In essence, the Bogotá experience proves that even cities from the developing world, that are not as wealthy, have the capacity to build bicycle-friendly cities.

Case study 2: Bicycling in Cape Town, South Africa

Cape Town has had a master plan for cycling since the 1980s, although cycling lanes for school children have been there before then (Curtis and Dicks, 2010). Cycling is now becoming a popular mode of transport and recreation in the city of Cape Town, with most people choosing to ride their bicycles to work, school and other destinations (CPT, undated). This increasing trend is encouraged by the city's growing network of cycle lanes, which is integrated with public transport such as the MyCiti bus, thereby making it easier for people to travel by bikes (CPT, undated). The city has a new 3mwide bicycling path which runs from Cape Town to Table



Figure 6 The Cape Town / Table View cycle path (Curtis and Dicks, 2010).

[8]Cicloviá now covers over 120 km of the city's main roads (Wright & Montezuma, 2004).

View following the Integrated Rapid Transport (IRT) bus lane along the R27 road (Curtis and Dicks, 2010). This 16km bicycle path is the longest cycle path in South Africa (Curtis and Dicks, 2010).

In an investigation on the Cape Town/Table View cycle path, Curtis and Dicks (2010) discovered that the feasibility of bicycling in terms of safety was ensured in the following ways:

- Making use of regulatory measures in the city on which cyclists are required to obey all traffic rules as the path is also used by pedestrians. The idea is to keep left all the times.
- The cycling path was designed in a way that guides cyclists to slow down on road intersections so as to negotiate pedestrians and turning traffic.
- Lining the cycle path with the BRT was deemed safe for cyclists as the BRT route has a number of CCTV cameras and sufficient lighting.

2.10. Conclusion

Cycling's recognition as the most sustainable mode of transportation has triggered bike - related initiatives in many cities. Most of these draw inspiration from the Dutch, Danish and German cities which have higher and growing levels of cycling; their cyclists represent virtually all segments of the population, with women being as likely to cycle as men (Pucher and Buehler, 2008). For example, 45% of all bicyclists in Denmark are women, 49% in Germany, and 55% in the Netherlands (Pucher and Buehler, 2008).

In order to make cycling more feasible, it must be integrated with public transportation. This is particularly important in fragmented cities where most people reside far from the city centre. Thus, public transport can help cyclists to make longer trips and also offer them an alternative in cases of bad weather encounters, hilly topography or mechanical failures (Pucher and Buehler, 2009).The main purpose of this study is to evaluate the feasibility of the CoJ's bicycling initiative and how it can benefit the city. The following chapter sets the context of the case study.



SETTING THE CONTEXT FOR THE CASE STUDY

3

Bicycling in the inner city of Johannesburg

3.1. Introduction

The apartheid regime used the transport system to facilitate segregation and discrimination, and as such, massive infrastructure investments oriented to private cars exacerbated problems associated with poor access and mobility in South African cities (Weakley and Bickford, 2015). However, CoJ has embarked on the process of changing the current car-oriented city landscape to a more sustainable 'people-centred' Johannesburg. Part of the initiative is to build a vibrant, equitable African city that provides real quality of life to all its inhabitants (CoJ, undated).

What triggered the need to initiate bicycling as one of the sustainable modes of transport in Johannesburg is linked to a broader philosophy that the City is now calling EcoMobility, a concept that was created by Konrad Otto-Zimmermann (EMWF, 2015). EcoMobility is a new paradigm which refers to "travel through integrated, socially inclusive, and environmentally friendly options" (EMWF, 2015: p5). These are travelling options such as walking, cycling and wheeling, and public transport, as well as car-sharing, provided that these are small urban vehicles that are powered by renewable energy (EMWF, 2015).

It is important to note that bicycling has always been in existence in the broader Southern African region. This chapter looks at the status of bicycling on a bigger regional scale, and later narrows it down to Johannesburg's metropolitan scale.

3.2. Bicycling in Southern Africa

Bicycles are used as a mode of transport to work and other facilities in Southern Africa. There are a considerable number of single speed roadsters (bicycles) transporting food or passengers in Tanzania and Zambia, and most of these bicycles are exported from China (Waal, undated). In South Africa, efforts have been made to promote low-carbon transport and it is acknowledged that this can be achieved through increasing the percentage of bicycle journeys in urban areas (DoT, 2006). Part of the need to increase bicycle use arose from the observation that many city dwellers do not use bicycles. This could be due to a lack of bicycling culture; in attempting to promote such a bicycling culture some institutional, cultural and financial obstacles have been faced, including a lack of bicycle infrastructure, theft and vandalism, compulsory helmet legislation, outdoor advertising by-laws, and lack of public funding (Jennings, 2011).

3.3. Bicycling in South Africa

The South African transportation policy context

South Africa's Draft National Non-Motorized Transport Policy aims to promote NMT as an essential mode of transport (DoT, 2009).Jennings (2011) notes that means to achieve this goal include public-funded bike rental plans that gained recognition by South African planners prior to the 2010 FIFA World Cup. As an example, she notes that the City of Cape Town and the City of Tshwane had both hoped to introduce bicycle rental projects during the World Cup.

The Non-Motorised Transport Policy envisions NMT that will be a sustainable mode of transport, essential for social and economic development and also calls for all Integrated Transport Plans(ITPs) to cater for the use of cycling (DoT, 2008). NMT is also supported by other policies including:

- **The White Paper on National Transport Policy 1996** - The policy aims to reduce automobile dependence and promote other, more sustainable modes of transport such as public transport, walking and cycling;
- **The National Road Traffic Regulations of 1999** - The policy addresses the conditions and standards of some aspects of NMT;
- **The Urban Transport Act 1977** - The Act advocates for the planning and provision of adequate urban transport facilities, and part of its role is to encourage the implementation of NMT (DoT, 2008).

In responding to the calls for NMT, the Gauteng Provincial government aims to create 5km of cycle lanes in Vosloorus and 10km in Kaalfontein as a way of acknowledging that pedestrian and cycle networks have the potential to promote social integration among residents (SAPA, 2014).

As with the purpose of this study, the aim is to pay a much greater detail to the CoJ's bicycling initiative. The context of this is discussed in the following sections.

3.4. Mobility - Gauteng City-Region

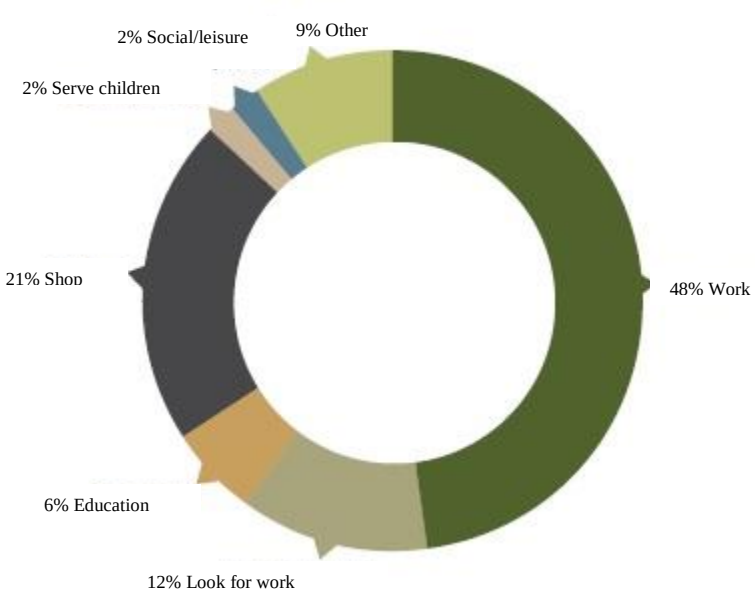


Figure 7 Most frequent trips in the GCR (Venter and Badenhorst, 2014).

The Gauteng City-Region Observatory (GCRO) 2011 Quality of Life Survey reveals records that were acquired through an analysis of transport data in the GCR. Figure 7 illustrates the purposes of the trips that people embark on frequently within the GCR. It demonstrates that almost half of the trips that people regard as their most frequent trips are to work (Venter and Badenhorst, 2014).

In addition, figure 8 represents the mode of transport that is used relative to the purpose of the trip. In this, what becomes clear is that most people either use cars/motorbikes or minibus taxis to work.

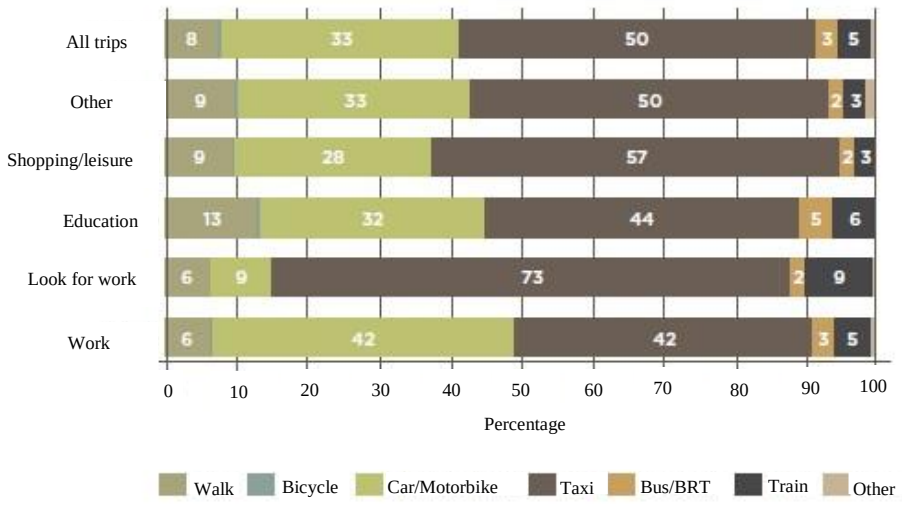
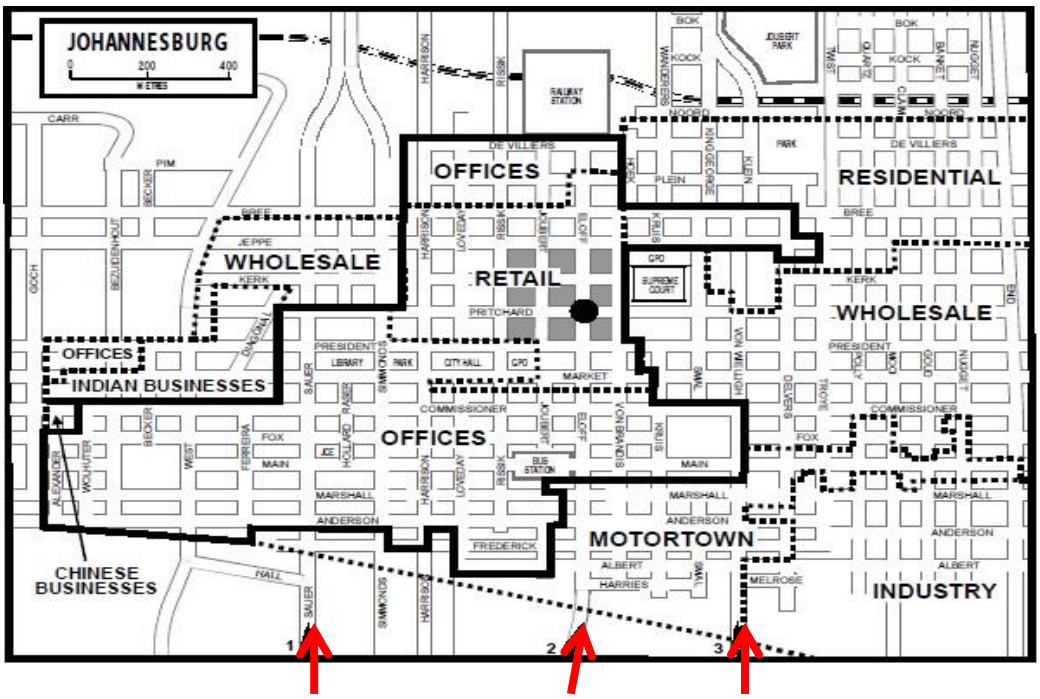


Figure 8 makes it evident that, despite government's policy intervention to promote bicycling in the country, a vast majority of people in the GCR do not consider bicycling as a viable mode of travel.

Figure 8 Mode of travel for the most frequent trips (Venter and Badenhorst, 2014).

3.5. The case of Johannesburg

Johannesburg experienced a great outward growth from the CBD in the 1950s, and consequently, there were only few entry points into the inner city.



Map 3: Direct access to the southern part of the city was only limited to three arterial roads in the 1950s.
Source: Beavon (2001)

According to Beavon (2001), a limited number of entry points to the inner city prompted the need for the local authority to improve the transport linkages to the CBD. He indicates that it was necessary for them to reduce a number of railway lines so as to make space to construct bridges, and as a result, five of these bridges were built between 1951 and 1954 making way for vehicular movement on Claim, Rissik, Harrison, Simmonds and Sauer Streets. He then takes note of a trend since then, of an increase in the number of cars in Johannesburg that jumped from 27 500 in 1933 to 110 000 in 1954 and 179 800 in 1964. Additionally, the traffic corridor linking Johannesburg and Pretoria currently has 300 000 cars per week day (Gautrain, 2015). In essence, Beavon (2001) makes a point that the initial local authority's decision to eliminate the trams in 1948, replacing them in part by buses, together with investment on road infrastructure, marked a point of change when most people opted for private car usage. The car continued to be the most appealing mode of transport to date, and this was further supported by the Gauteng provincial

government's expenditure of R30 billion on highway upgrades during the 2010 FIFA World Cup preparations (Seftel, 2012).

However, the CoJ has committed itself to sustainable development goals and part of that is to promote sustainable urban mobility. In this, the City intends to create a sustainable urban environment with a liveable landscape that supports low-carbon economy initiatives (CoJ, undated). This encompasses establishing eco-efficient infrastructure solutions (CoJ, undated) on which EcoMobility plays a role.

In working towards making Johannesburg a bicycle-friendly city, the Corridors of Freedom (CoF) initiative has been introduced and it envisions an urban fabric which is supported by well-defined transport arteries (CoJ, undated). As seen in the most recent 2012/16 IDP entitled *JOZI: A City @ Work*, the notion of sustainability plays a crucial role in developing this. Sustainability is not only about providing infrastructure or preserving the environment, it also encompasses creating a sense of identity, by creating well designed built form that promotes a mixture of land uses, walkability and cycling facilities (CoJ, undated).Moreover, this aim is further reflected in one of the goals of the Johannesburg Strategic Integrated Transport Plan Framework which is to "promote public transport, walking and cycling as modes of choice in Joburg" (CoJ, 2013: p41).

Despite the City's desire to promote pedal-powered mobility, there exist a number of factors that may hinder the success of the current bicycling initiative. These factors encompass issues of safety as it is inescapable that the roads were not built for NMT purposes. Records show that 28% of non-natural deaths in the Gauteng Province resulted from road crashes, and 40% of these were pedestrians and 5% were cyclists (Seftel, 2012). This is because cyclists and pedestrians have to compete with motorists in the inner city. The City has therefore adopted one of ICLEI's Urban Agendas- *EcoMobile City Agenda* in the EcoMobility World Festival 2015.

3.6. Factors that determine bicycle use in Johannesburg

The current bicycling initiative relies on a number of factors to either be a success or failure. These factors can be grouped into two main categories, namely:

3.6.1. Those that can be controlled or changed though policy interventions in order to stimulate a bicycling culture in the city. These include making provision of supporting infrastructure and facilities, and creating educational campaigns, so as to

raise awareness in the city. This is important for Johannesburg as it generally lacks a bicycling culture (Figure 9).

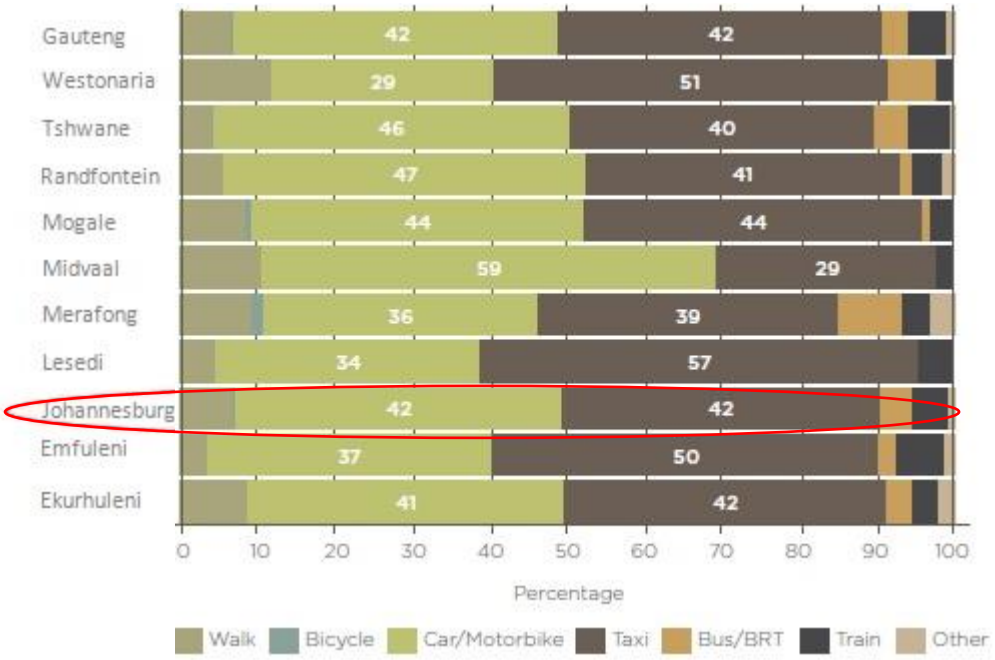


Figure 9 Mode of travel used to work, by municipality (Venter and Badenhorst, 2014).

3.6.2. Natural factors that cannot be altered such as climate and the city's terrain. Such factors must be well considered during the planning phase of the bicycling initiative. A sneak preview of Johannesburg's climate and topography is provided below, together with the implications of each natural condition.

3.7. Climate

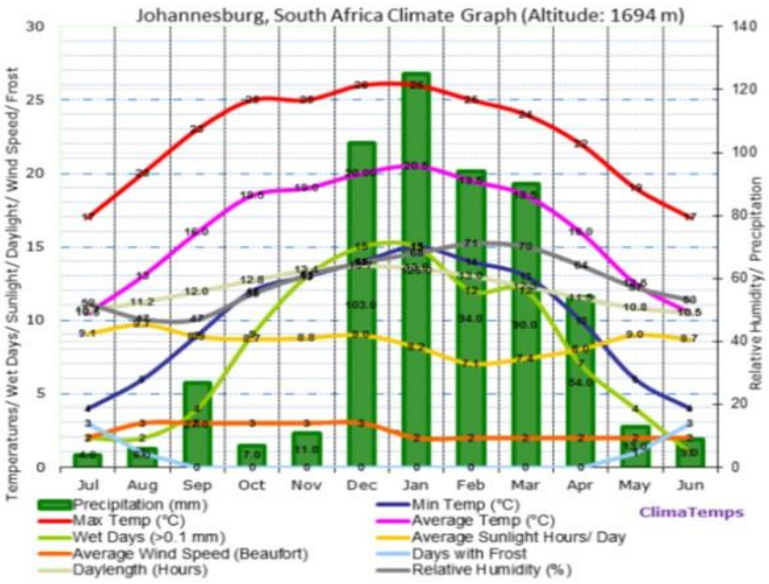
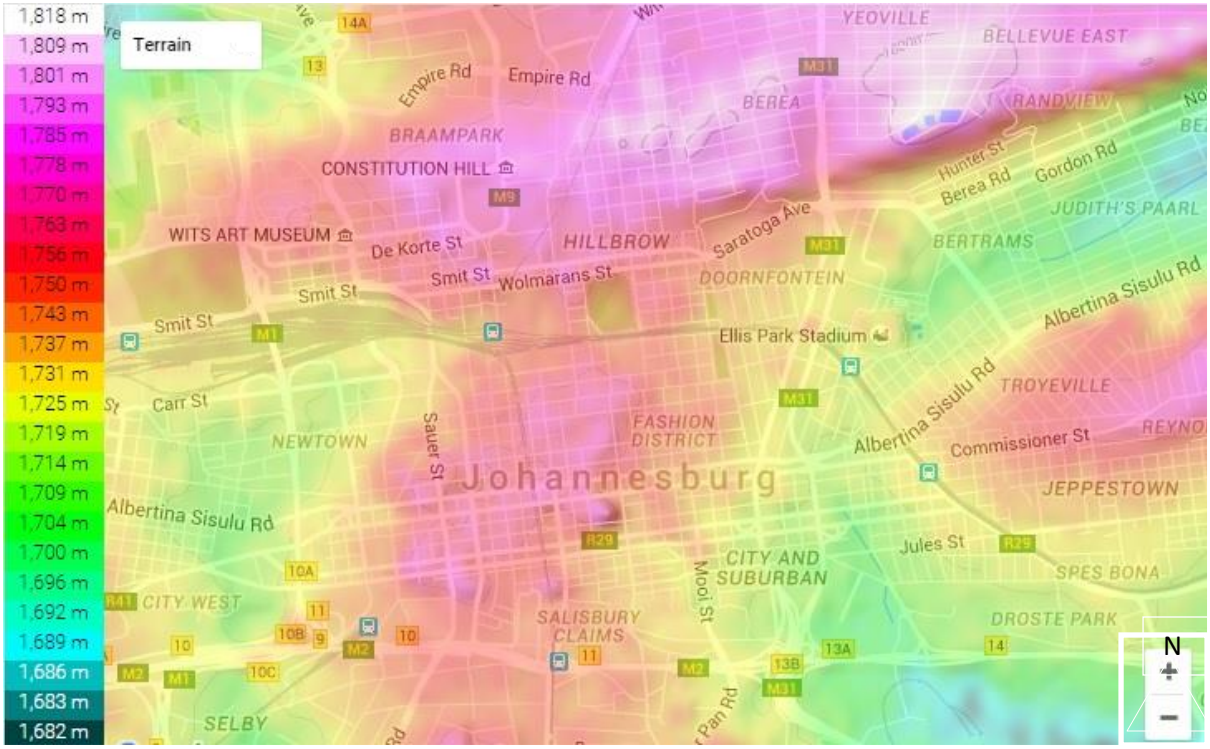


Figure 10 Johannesburg Climate Graph in Metric Units (Climatemps, 2014).

Weather is one of the factors that affect people's choices of transport modes, especially in relation to walking and cycling (CoJ, 2009). Johannesburg's location at the centre of the Highveld (at an elevation of 1,753 metres) allows it to receive an annual rainfall of 760 millimetres (EasyExpat, 2008). The climate graph above illustrates monthly average temperatures, precipitation, wet days, sunlight hours, relative humidity and wind speed in Johannesburg.

According to this graph, NMT activities may be affected by an increase in precipitation, especially in the summer season (the period between December and February). During this season, the use of NMT can only be made feasible if there is adequate shelter to protect cyclists and pedestrians.

3.8. Topography



Map 4 - Inner city Johannesburg Topographic Map (topographic-map.com, undated).

It is evident from the topographic map that the study area (inner city of Johannesburg) generally has a hilly topography. This limits bicycling as a mode of transport as it does not only require increased effort from bicyclists, but also holds the potential to discourage people from embarking on bicycle journeys especially when travelling extensive distances. The implication of this is that, if bicycling is to become a feasible mode of NMT, it must be integrated with public transport so as to allow bicyclists to have seamless journeys.

Case study 3: EcoMobility World Festival 2015, Johannesburg

As part of ICLEI's Urban Agendas of the *EcoMobile City Agenda*, the CoJ has adopted the idea of an EcoMobility World Festival. The month-long festival took place in the Sandton CBD in October 2015 with the aim of demonstrating that making use of public transport, walking and cycling is not only possible, but also accessible, safe and attractive (EMWF, 2015).

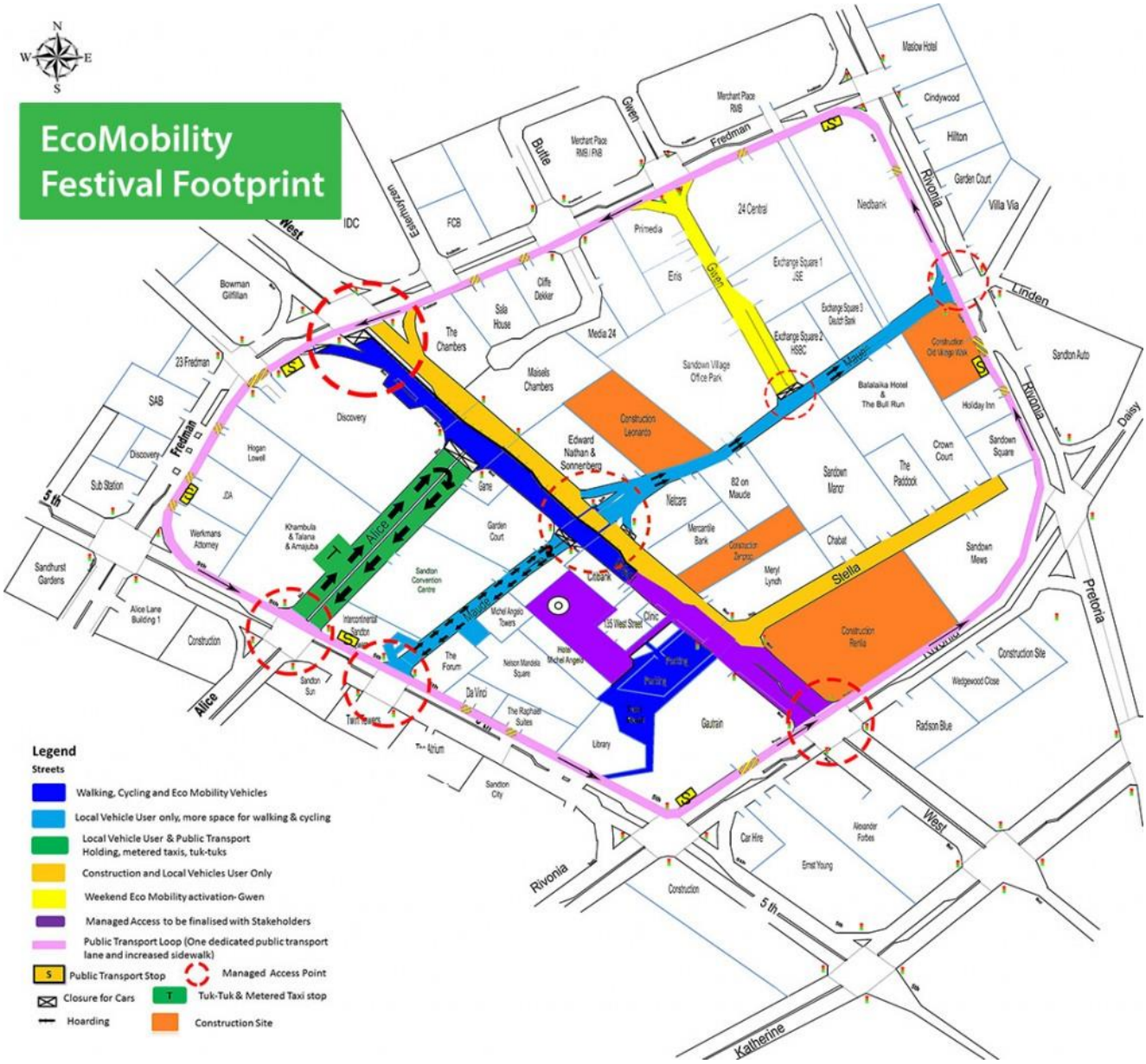
Sandton, one of the fastest growing nodes in South Africa and the most congested precinct in Johannesburg, has about 80 000 cars that go in and out on a daily basis and as a result the time lost in traffic is revenue loss for business (EMWF, 2015). The festival was brought to decongest

the district of Sandton, and the following were the changes that were expected to be seen throughout the festival:

- People swapping their car keys for bicycle helmets,
- transport integration to ensure seamless transitions between rail, bus, taxis, cycle lanes and pedestrian activities,
- and quality infrastructure that links Sandton with the rest of the City and region (EMWF, 2015).

Outcomes of the festival are to be evaluated. This will give a sense of direction as to whether the local municipality of Johannesburg is likely to succeed in its EcoMobility agendas or not. The feasibility of this festival may come in handy to strengthen the officials to put more effort in ensuring that the idea of promoting bicycling throughout the City succeeds. Its failures will also help them to draw experiences on how to better similar future campaigns.

Map 5 below is a representation of the EcoMobility Festival Footprint.



Map 5: Sandton during the festival. Source: Fripp (2015).

3.9. Why is it important to proceed with this research?

This research is going to provide an academic analysis and insight of the steps taken towards achieving a bicycle-friendly city in Johannesburg. It is going to delve into the extent to which the City's bicycling initiative is feasible, identifying the key constraints and therefore making use of the literature to draw possible recommendations on how the initiative can be improved. The study will conclude by examining and predicting whether Johannesburg is likely to remain automobile-centric, or become effectively converted into a desired bicycle-friendly city.



ANALYSIS OF FINDINGS
What has field work revealed?

4

"<u>All kinds of people must cooperate to build a shared vision</u>

Building a shared vision is crucial to turning today's grimy, noisy, smelly cities into healthier and happier cities for people"

Jong and Rouwette (2009, 4)

4. Introduction

This chapter presents and analyses some findings that were discovered during fieldwork. It mainly interprets data that were acquired from primary information through interviews, first with state officials, followed by the views of the city residents. However, due to ethical reasons, participants' identities are not revealed. And as a result, the researcher made use of the following names to refer to interviewees throughout the chapter.

- The interviewee from the GDRT as the Gauteng official,
- CoJ interviewees as CoJ official A and CoJ official B,
- City residents as Anonymous, and
- GCRO participant as the GCRO representative.

The chapter seeks to make use of primary information together with secondary data to answer the research question. Thus, analysis of these findings is going to play a crucial role in forecasting the future of bicycling in the inner-city of Johannesburg.

4.1.Policy position in terms of NMT across the three spheres of government

The state officials who were interviewed made reference to DoT's NMT policy, and the Shova Kalula National Bicycle programme. According to DoT (2014) Shova Kalula, a programme that was piloted in 2001, sought to improve mobility and access to basic needs, together with social and economic opportunities for people in rural, remote and poorly resourced areas including learners. This was to be achieved by making provision of bicycles to these communities with the initial target of distributing 1 million bicycles across the provinces by 2010 (DoT, 2014). During the interview, the Gauteng official (15/09/2015) said "In our department (as part of the National Departments' Shova Kalula), we distribute 3000 bicycles every year and we go to different schools in the province. And in the last few years, we have focused on the schools where learners are walking 5km or more to schools. So, rather than providing buses or other forms of transport, we identify those learners with the School Governing Body and we give them a bicycle. It is a form of mobility to school, but whether it will be used as a form of transport in future we do not know". However, CoJ official A felt that the programme has been fairly restricted considering that it has been found to cater for only young people and school goers, as opposed to really pushing the idea of NMT as an important component of the transport system. Thus, for NMT

goals to be pursued successfully, it must be promoted to accommodate all members of the society as opposed to remaining restricted to only a certain category of people.

Primary information also revealed the NMT policy position in Gauteng Province. In support of CoJ's bicycling initiative, the Gauteng official confidently pointed to the Gauteng 25 - Year Integrated Transport Master Plan which sets out the comprehensive view of what the provincial government would like to see in the transport system over the next 25 years. The plan serves as the guiding framework for the province and its municipalities. The Gauteng official also indicated that forming part of the framework is a policy decision that was taken to actively promote NMT beyond sport and recreation. He emotively argued that as a policy position "We would like to see cycling as a form of mobility, and particularly for short distances we would like people to start using bicycles" (Gauteng official, 15/09/2015). While all the interviewed state officials seemed eager to promote CoJ's bicycling initiative, they all acknowledged that a bicycling culture is lacking in the society. This is one of the major challenges of the CoJ's bicycling initiative that threatens its potential of becoming feasible.

4.2.Factors limiting the rise of a bicycling culture in the inner city of Johannesburg

The existence of a poor bicycling culture in Johannesburg is affected by numerous factors. These encompass the following:

4.2.1. Lack of availability of bicycles

Unlike most other cities that have long built cycling infrastructure and made provision of bike-sharing systems so that people can have access to bicycles, Johannesburg's bicycling initiative is still new. As a result, there is much to be done in terms of establishing a bike-sharing system which will enable people to have access to bicycles, and hence this will stimulate the bicycling culture.

4.2.2. Lack of integration with public transport

When he was asked about the integration of NMT with public transport, the Gauteng official (15/09/2015) answered "We are very far from that". CoJ official A believes that a lack of integration with public transport has a negative impact on the city's bicycling culture. She referred to one of the rules of the Gautrain, which prohibits people from getting into the train

with a bicycle, unless it is covered in a bag, as a limitation. It is therefore crucial for decision makers to work on measures that can be taken to integrate NMT with public transport. Failure to do this could lead the bicycle lanes to turn into white elephants.

4.2.3. Road safety

Road safety also stood out as one of the most limiting factors of a bicycling culture in the inner city of Johannesburg. The Gauteng official noted that road safety is government's weakest point, and also emphasized that, of the many road accidents that have been experienced across the province, about 940 on average were NMT users. He explains that, if not addressed, this risk factor is most likely to remain a barrier to bicycling as a mode of transport. He also highlighted that people are saying "we are prepared to consider cycling but we're scared" (Gauteng official, 15/09/2015), and therefore believes that a remedy to the situation would be greater law enforcement compliance. The bicycle lanes in Braamfontein were used as example in the interview, and in that he was talking specifically about vehicles that park on them. The Gauteng official therefore remarked that such vehicles must be towed away, and the owners must pay massive fines. This, he felt was a regulatory measure that would help to keep the bicycle lanes free from vehicle intruders.

According to Njogu (2015), another CoJ official disclosed that:

- The City has set up a dedicated cycle lane patrol unit through the JMPD,
- and the bicycle lanes are being patrolled and monitored constantly.
- Approximately thirty one motorists have been ticketed for parking on the bicycle lanes since the 31st May 2015 and in the same period about 6 cars were impounded.

However, the researcher discovered that there was a debate about the JMPD intervention on the monitoring process of the bicycle lanes. At the beginning of the EcoMobility World Festival, the researcher took part in one of the stakeholder dialogues[9]–Travel Demand Management Workshop. One of the biggest debates was the City's proposal of having members of the JMPD to monitor the bicycle lanes using cars. The City supported the proposal on the basis that car use would enable JMPD officials to be able to attend to different areas faster. This was disapproved

[9] Participants included transport experts, City officials and the public.

by some of the workshop participants, who rejected the idea of making use of a motor vehicle to monitor the lanes. These opponents argued that for bicycling to be meaningful in the inner city, JMPD patrollers must lead by example and hence it came highly recommended that they operate on bicycles as opposed to cars. Thus, instead of having five JMPD officials in one car located in one area, it was suggested that the best approach would be to give each one of them a bicycle and spread them throughout the inner city. These opponents believed that this held the potential to attract more cyclists on the bicycling lanes.

City officials seemed dissatisfied with the suggestion and the argument was closed without a notable conclusion. Such differences in views between City officials and the public may have an adverse effect on the promotion of a bicycling culture in the inner city.

Additionally to the issue of road safety, the Gauteng official suggested the 'Complete Street' model which calls for the need to change the way road spaces are designed. This is about designing roads in such a way that they are dedicated to all road users, including cars, public transport, pedestrians and cyclists.

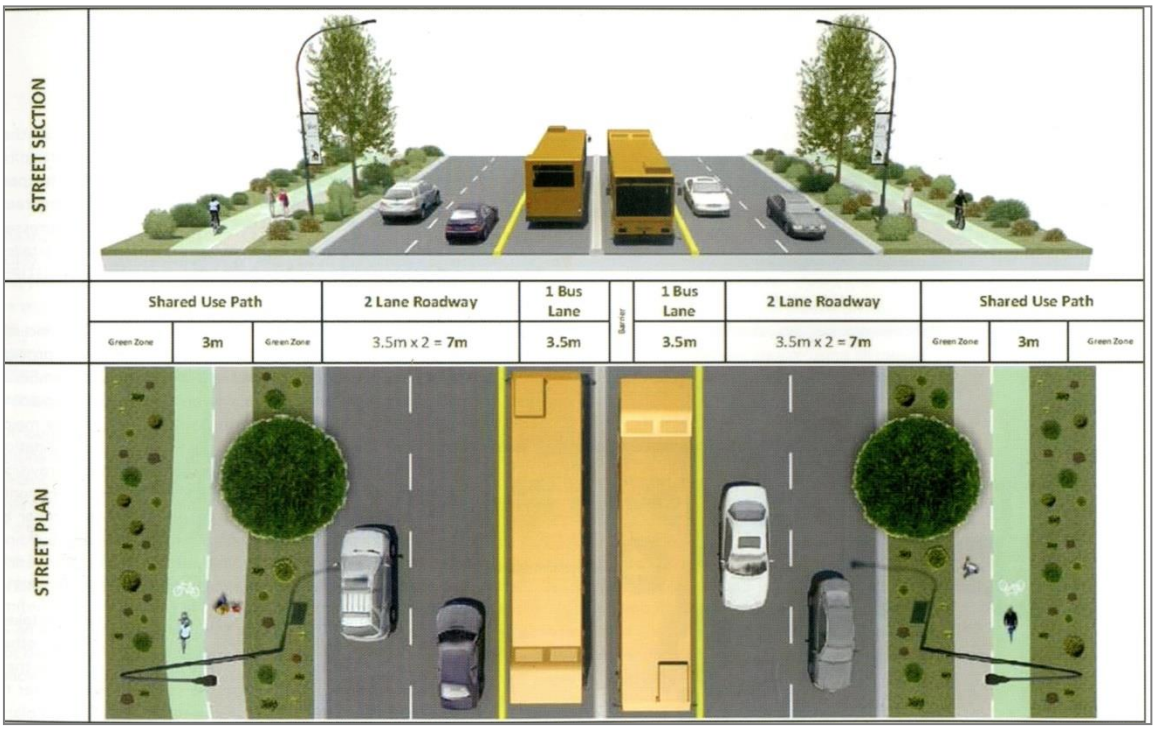


Figure 11 – 'Complete Street' model.

4.3.Citizen's perception of the City's bicycling initiative

During the course of the study, the researcher found it necessary to interview city residents who commute to different locations in the city on a daily basis. Twenty interviewees who live and work/study in the inner city were selected on the basis that they live in a close proximity to a variety of facilities. This was done with the aim of finding out how they currently navigate their ways through the city and how they perceive the CoJ's bicycling initiative. Most of the interview participants were students who reside in Johannesburg's inner city. Their input was important as most of their daily travelling distances to tertiary institutions are less than 5km. That is, the hypothesis is that given the necessary bicycling infrastructure and availability of bicycles, students are most likely to cycle to education facilities on a daily basis. Interviewees were aged between 19 and 35 years of age. Findings from these interviews are summed up into three categories as discussed below.

4.3.1. Mobility

Most of the interviewees walk to school on a daily basis. This human-powered mode of travel appeared to be sustainable in terms of costs, as users acknowledged that walking has no monetary costs. However, a number of them complained about a lack of safety, mainly because motorists (particularly mini bus taxi drivers) tend to ignore their presence on the roads. Road intersections were referred to as the most dangerous points especially during peak hours.

While most students walk to school, some walk to the nearest bus stop or taxi rank to gain access to public transport. Thus, some of the students indicated that they rely on buses and taxis to get to their educational institutions on a daily basis. These students make use of taxis and buses, as these were also said to be cost effective.

Those who were found to be using cars for distances that are less than 5km justified their mode of travel on the basis that car use is more comfortable than any other mode of travel. However, all the interviewed students' visions were to purchase cars as soon as they complete their tertiary education. This implied that, even though bicycling was sometimes considered as a mode of transport, it would only be used for temporary, as they cannot afford cars at the moment. In essence, the car remained to be the most attractive mode of travel for city residents, despite distance considerations.

4.3.2. The status of the bicycle as a mode a mode of transport

Drawing from the interviews, it might be safe to assume that most people do not own bicycles in the inner city of Johannesburg. Some interviewees highlighted that they used bicycles only when they were younger. "I stopped riding my bicycle when I left high school. But even then, I would only cycle for fun" Anonymous A (20/09/2015).

When asked about the status of bicycling as a mode of transport, interviewees had some varying opinions. While some thought it was a great idea, a number of them were completely against bicycling as a mode of transport. Anonymous B emotively stated that "I wouldn't use it. It is not safe, especially for us as women" (20/09/2015). In this, Anonymous B's argument was based on the issue of vulnerability. She believed that women are more vulnerable than men, and as such, bicycling, especially for long distances with some portions of the road that are secluded, is unsafe. She also linked the issue of safety to the fact that motorists hardly give way to pedestrians and cyclists on the road.

4.3.3. Perceptions of the City's bicycling initiative

The following three categories provide a snapshot of the interviewees' responses to the current bicycling initiative of the CoJ.

<u>Optimists</u>

- "I think bicycle use might be a good idea because I spend too much time on the long taxi queues every morning. Once I finally get into a taxi, there is a huge traffic jam. I end up arriving late at work" Anonymous C (20/09/2015).
- "It's a perfect initiative from government" Anonymous D (20/09/2015).

<u>Pessimists</u>

- "I think the bicycle lanes are pointless because no one really uses a bicycle in the city" Anonymous F (20/09/2015).
- "The lanes are too narrow. Nothing stops cars from invading their spaces." Anonymous A (20/09/2015).
- "I was never taught how to drive with a bicycle on the road. In South Africa, we are always told that if we encounter situations that are beyond our control on the road, we

must step to the shoulder of the road. And now they put bicycle lanes, where am I supposed to go in case of emergency? So, it's creating chaos!" Anonymous E (20/09/2015).

Surprises

- "I have seen a lot of the construction going on in the city, but I didn't even know that it was for bicycles" Anonymous G (01/10/2015).

4.4.Need for advocacy?

In working towards overcoming challenges of promoting a bicycling culture in the inner city of Johannesburg, government officials who were interviewed emphasized the need to collaborate with various bicycling association clubs in the society. The Gauteng official stated that "There is a category of people who are cycling to work, but they are never seen on the road, nobody gives them a second look" (Gauteng official, 15/09/2015). He is therefore of the view that advocacy, in the form of educational campaigns, is important as apart of changing the sense of ownership of the road.

During the course of the study, the Jo'burg Urban Cyclists Association (JUCA), a civil society organization that aims to give voice to commuter cyclists in Johannesburg, was identified as one of the bicycling organisations that works with the CoJ in promoting bicycling as a mode of transport. A member of this NGO (referred to as a JUCA representative in the study) was interviewed to provide an insight into the organisation's commitment and engagement, particularly as regards in the bicycling initiative in the inner city of Johannesburg. The JUCA representative disclosed that the organization is committed to raising voice on behalf of commuter cyclists and also liaising with the authorities in the best interests of the promotion of cycling in the city.

When she was asked about the organization's advocacy role in building a bicycling culture, the JUCA representative (27/08/2015) said: "One of our key projects has been the launch of a Commuter Cycle Map[10] which really begins to show what JUCA members perceive as 'safe cycling routes' in and around Johannesburg. That's not only where cycle lanes have been built,

[10] Appendices D: Annexure 1

it's also proposing smaller back roads, and we want the City to come up with a full cycling masterplan… the City has built the lanes, as JUCA we have a strong view, and personally I have a strong view of having an activation plan…to see empty cycle lanes looks like tax payers' money going down the drain. So, there has to be an activation plan for those lanes. And I am hopeful that in the next few months the City might be looking into ways to activate those cycle lanes". She also revealed that the Commuter Cycle Map was developed in collaboration with the CoJ, as well as the University of the Witwatersrand. Such collaboration between the state and the civil society was a crucial component of the promotion of bicycling in the city. It raises the likelihood of making bicycling feasible as a mode of transport.

4.4.1. Lack of integration with public transport

According to Bickford (2013), the lack of modal policy integration has resulted in transport systems which are not spatially and operationally integrated. It is therefore not surprising that in Johannesburg, bus routes that were built did not include space for bicycle paths (Curtis and Dicks, 2010). This is problematic, considering Johannesburg's hilly topography as it makes bicycling difficult with extended distances. The research therefore identifies this as another area that requires some form of advocacy, so as to promote bicycle use with seamless journeys and more convenience. The JUCA representative explained that such an advocacy is also pursued by JUCA. She argues that "…cycling is not a standalone thing. It's really part of how you build an integrated transport system. And cycling is an important potential last mile once people get off public transport" (JUCA representative, 27/08/2015). The organization does not support Gautrain's rule that prohibits commuters from entering the train with the bicycle. They are of the opinion that people must have the ease of access to public transport with their bikes.

4.4.2. Capacity building

The CoJ official A highlighted that the feasibility of bicycling, as a mode of transport, in moving away from the automobile-centric Johannesburg largely depends on the City's intervention. However, she argues that the City must build capacity in NMT in such a way that those who oversee the bicycling initiative are not car-captive. "Those who are planning and designing public transport systems have to make sure that they cater for a service that looks at the journey of a commuter comprehensively. You should be thinking about someone leaving their home, the

lighting on the route that they're walking/cycling, the infrastructure for them to either walk or cycle until they get to the public transport mode" (CoJ official, 27/08/2015).

4.5. A Brief Photo-Essay: Bicycle lanes in the inner city of Johannesburg

The photographic essay zooms into how city residents are making use of the designated bicycle lanes in Braamfontein

BICYCLING- THE BEGINNING OF NEW HOPE FOR JOHANNESBURG?



Figure 12: Government officials at the construction site of the bicycle lanes

Government officials are very optimistic about the future of bicycling in Johannesburg.

THE CONSTRUCTION PHASE



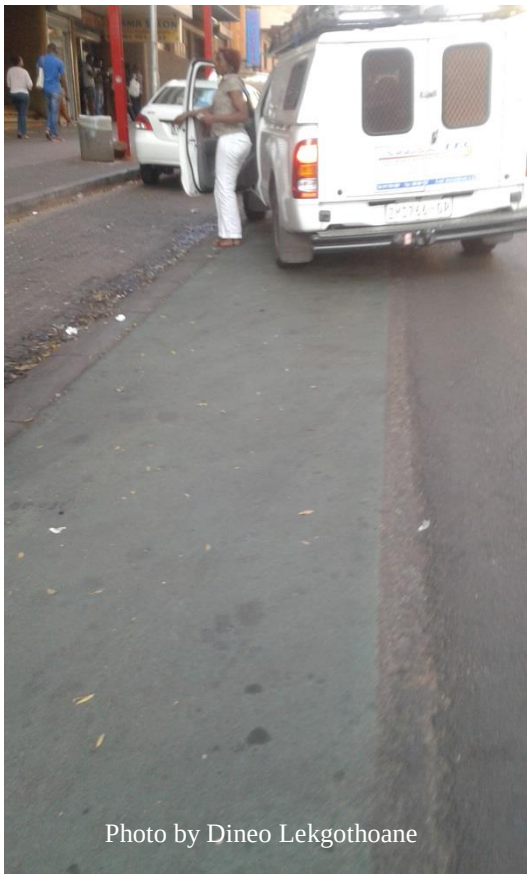
Figure 13: Construction of the bicycle lanes in Braamfontein

For the first time, people begin to see the construction of bicycle lanes in Johannesburg

BEHAVIOUR TOWARDS THE BICYCLING LANES



Source: Njogu (2015)


Photo by Dineo Lekgothoane

Figures 14 and 15: Motorists park their cars on the bicycle lanes

"We have been very excited about the construction of bicycle lanes in Johannesburg. However our excitement has been dampened by poor motorist conduct on the lanes…"

Njogu (2015)

"…This diminishes the value of the bicycle lanes"

Njogu (2015)

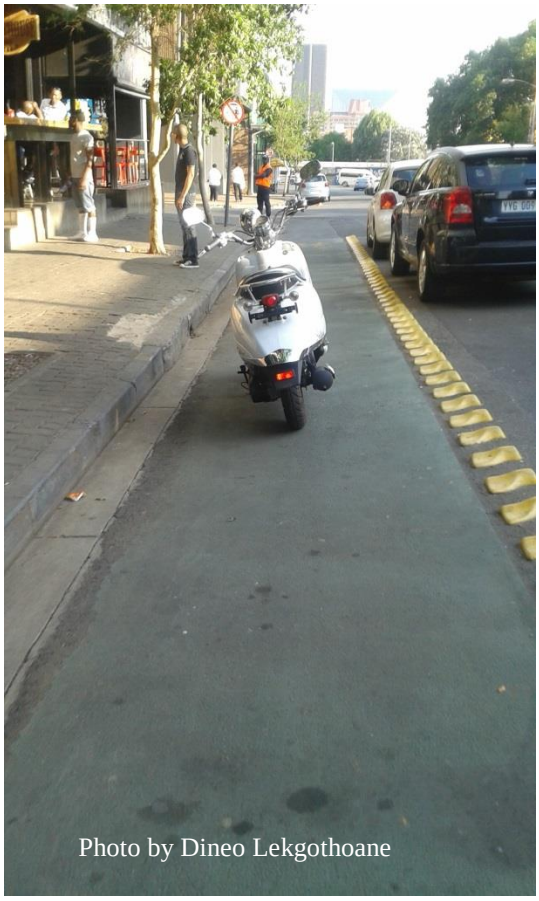


Figure 16: Bicycle lane used for motor bike parking

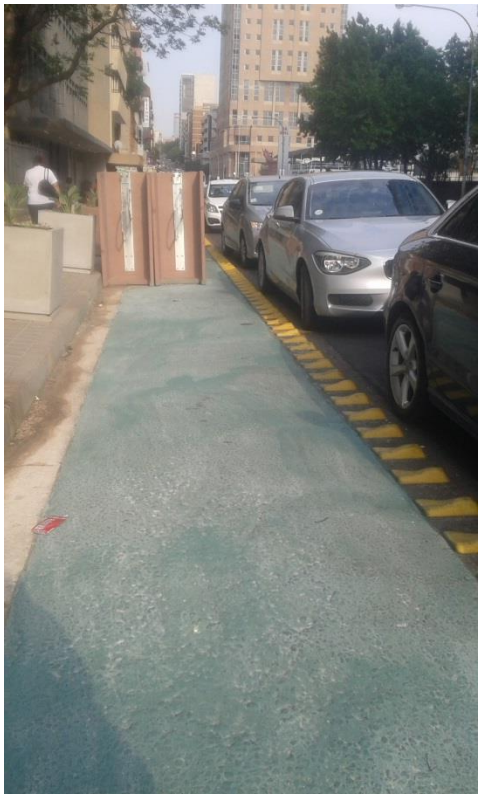


Figure 17 - Bicycle lane used as temporary storage

Although motorists are often found to be degrading the use of the bicycle lanes, field work revealed that in some parts of the city, other city inhabitants use the lanes as temporary storage

IS THERE PROGRESS?

The City is now providing bicycle parking stations in the streets where bicycle lanes have been created. While this shows progress, most of the residents that were interviewed did not seem to know what these were. This implies that a lot is still to be done with regards to informing people about the infrastructure that is provided as this can stimulate cycling activity.



Figure 18: Bicycle parking area

Photos by Dineo Lekgothoane



Figure 19: A cyclist making use of a bike lane

"People on bicycles in the city itself are as rare as men in 12-inch heels"

Janet Smith (2015)

ON-STREET BICYCLE LANE DISCONTINUITIES

Different discontinuities affect bicyclists' levels of comfort (Krizek and Roland, 2005).Discontinuities refer to the location in which on-street bicycle lanes end (Krizek and Roland, 2005).



Figures 20 and 21 - Discontinuities of the bicycle lanes

The bicycle lane ends in these examples

"The cycling lanes are not as wide, they are unsafe. Sometimes the lanes stop in the middle of the road, and then you wouldn't know where to go as a cyclist."

Anonymous H (03/10/2015)

4.6. Behaviour change programs

CoJ official B (09/10/2015) highlighted that the City currently has a number of campaigns that have been put in place to promote bicycling. He mentioned Freedom Ride as one such example. He also referred to an upcoming campaign that will commence in the 2016 academic year during student registration weeks at both Wits University and University of Johannesburg. During this period, the City will visit the universities with the intention of spreading awareness of the importance of bicycle use. Part of this will be to lend students and lecturers bicycles for a test ride on the designated bicycle lanes in the inner city of Johannesburg. Participants will be expected to report their feedback to the City on how their riding experience was. The City has also printed a stack of pamphlets that are going to be sent out to the residents to inform them more about the City's bicycling initiative.

4.6.1. Can these campaigns stimulate a bicycling culture in the inner city of Johannesburg?

"Without these campaigns cycling is not going to work" CoJ official B (09/10/2015). This was CoJ official B's response with regards to the feasibility of campaigns that seek to promote bicycling in the city (09/10/2015). He also made reference to other tactics[11] that are being considered including:

<u>Examples of strategies that do not work</u>

- Coercing people to cycle - Telling people what to do may not necessarily encourage them to start opting for bicycles as a mode of transport. It is rather best to build an environment that influences people to embark on bicycle trips. For example, creating attractive bicycle lanes.
- Badly targeted programs – this includes creating campaigns that scare people, as opposed to stimulating their interests in bicycling.

<u>Examples of strategies that work</u>

- Getting the most influential people (such as government officials and celebrities) to cycle
- Bicycling competitions and celebration of achievements; the reduction of bicycling anxiety.

[11] He was making reference to the Behaviour change program in Appendices E, Annexure 1

4.7. Conclusion

Field work has revealed various aspects of factors affecting the likelihood of bicycling being a success in the inner city of Johannesburg. It became clear from state officials' views that bicycling in Johannesburg is not detached from the broader NMT agendas in South Africa, and hence the Shova Kalula National Bicycle programme was referred to as an example of bicycling initiative in the country.

What was evident throughout the study's fieldwork was the fact that Johannesburg generally lacks a bicycling culture. Factors limiting the rise of such a culture in the inner city of Johannesburg included lack of availability of bicycles, lack of integration with public transport, and issues around road safety. However, questions of affordability of bicycles were not raised as concerns. Potential cyclists appeared to be more anxious about their safety on the roads.

Due to time constraints, the researcher could not identify commuter cyclists in the inner city of Johannesburg as these are rare to find. However, interview participants who relied on cars, public transport and walking for most of their journeys, generally seemed to lack the understanding of the importance of adopting bicycles as part of sustainable transportation. Some of these participants were people who only engaged in bicycling at some points in their lives, when they were younger, for recreational purposes.

In conclusion, although the CoJ has been in the process of constructing the bicycling lanes in the inner city, more work is required to stimulate a bicycling culture. Advocacy by the state in collaboration with various bicycling association clubs in the society has a crucial role to play in achieving this. Thus, the CoJ's bicycling initiative will be feasible if the limitations of the bicycling culture are addressed. Failure to a) integrate NMT and public transport, b) address issues around road safety and c) educate people about the importance of adopting bicycling as a sustainable mode of transport will only dampen the value of bicycling in the inner city and hence the designated bicycle lanes may turn into 'white elephants'.



CONCLUSIONS AND RECOMMENDATIONS

5

"Bicycle-friendly cities can moderate the ongoing growth of car use in the future. In many developing countries the real challenge is indeed to prevent a massive shift from sustainable modes of transport to unsustainable private cars, and to sustain the present high levels of active transport."

Godefrooij and Schepel (2010, 24)

5.1. Introduction

The study has highlighted some limitations that threaten a successful rise of a bicycling culture in the inner city of Johannesburg. Issues of road safety appeared to be one of the areas that require the most effort from government. Both the state and the public seemed to be having converging views on some of these challenges. State officials acknowledged that road safety was one of their weakest points; whilst most city residents highlighted that some of their reasons for not embarking on bicycle trips was reasons concerned with lack of safety on the road.

This chapter takes into consideration all that the researcher has assimilated throughout the study, and begins to present some recommendations that may be useful in pursuing a bicycling agenda in the inner city of Johannesburg, and this is later followed by concluding remarks on which the researcher seals the main argument of the study.

5.2. Recommendations

Wittink (2009) suggest that for a bicycling initiative to be feasible in an urban setting there has to be a society-wide support. As a result, education and awareness building are proposed as instruments that are required to promote a bicycling culture in a meaningful way. During the interview sessions with government officials, it was evident that members of the CoJ are aware of this. And as a result, the City has formed partnerships with various employers to promote bicycling. These include big companies such as Hollard and Discovery Health and part of their role is to encourage their employees to cycle to work.

Gaining society-wide support

It is important to note that if the City's bicycling initiative is to gain a society-wide support, the state and the public must reach a consensus with regards to what may be deemed the most appropriate way of monitoring the existing bicycle lanes. Drawing from the point referred to in chapter 4, about the debate that occurred between the CoJ and other stakeholders during the EcoMobility Festival - Travel Demand Management Workshop, it comes highly recommended that the CoJ considers the views of the other stakeholders who believe that the JMPD bicycle lane patrolling team must operate using bicycles, as this may stimulate cycling activity in the city. Taking their views into consideration will get people to feel that they have a say on matters

affecting them in the city, and hence this could be advantageous to the City's bicycling initiative in the long run.

Education

Residents of the inner city of Johannesburg must be taught to use both bicycles and the relevant infrastructure in the best possible way. This requires educators and instructors, students and parents in some cases. Education is important because it holds the capacity to help build a society where road users can learn to cope with one another. Such educational initiatives may include having tutorial sessions with some of the city residents who cannot ride. This can encompass having bike safety programmes, as well as information on bicycle helmets. This will enable people to be more alert about bicycling activity, basic techniques and its associated benefits.

These educational campaigns must not exclude motorists and other road users, as this may help in building a society where one category of road users is well informed about the importance of taking recognition of other road users and acknowledging their presence on the road.

Awareness building

Awareness refers to the manner on which these people will be taught about the benefits of the bicycling initiative. This implies that people must be taught about sustainable transportation and its long-term benefits. Such awareness could help in building a more informed, responsible society. This approach involves marketing and communication techniques. It would be useful to use a variety of languages to spread the message. In the context of Johannesburg, awareness may be communicated using a variety of languages including indigenous languages. This might be highly beneficial as the city comprises a diversity of people from different ethnic backgrounds.

Each of the two components (education and awareness) has an essential role to play in advocating more strongly for a bicycling culture.

Advocacy – Bike to Work campaigns

The EcoMobility World Festival is a good start in moving towards sustainable transportation and in promoting bicycling. It would also be useful if the CoJ worked with civil organisations and

companies to advocate for bicycling in the inner city. The municipality can collaborate with companies to encourage employees to bike to work on particular days. Such a 'bike to work' campaign would be useful in further spreading the message of promoting bicycling as a mode of transport.

Integration of bicycling with public transport

It is highly recommended that the CoJ pushes the bicycling agenda together with its integration with public transport. Since bicycling is more convenient for short distances, modal integration makes it even more convenient by increasing accessibility (Pardo and Sagaris, 2009). Figure 22 summarises a trip chain of cyclists when discussing the integration of bicycling with public transportation. This integration can help change people's perceptions, and stimulate their interests in bicycling. Thus, at the moment the CoJ's bicycling initiative may be less feasible as biking is currently isolated from public transport.

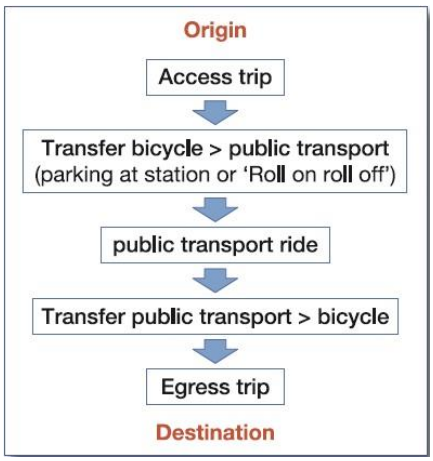


Figure 22 Components of a trip chain when discussing bicycle and public transport integration (Pardo and Sagaris, 2009).

Introduction of a bike-sharing system

As the CoJ's bicycling initiative is still new, it would be beneficial to the city if the CoJ introduces a bike-sharing system. This will allow many people to gain access to bicycle use.

The state also needs to revise the Shova Kalula National Bicycle programme. It must be amended to promote bicycle use as a mode of transport as opposed to being restricted to school children and rural residents.

Bicycle paths must be continuous and well defined

Issues of road safety may be addressed through the design phase of the bicycle lanes. The photo-essay has demonstrated that the bicycle lanes that have already been constructed appear to be discontinuous, leaving cyclists to find their own paths in the middle of the road.

5.3. Conclusion

As with the research question of the study and the stones that the study managed to turn through the literature, it is safe to assume that it is not impossible to achieve a feasible bicycling culture in a city like Johannesburg. The feasibility of bicycling in the inner city of Johannesburg relies on a society-wide support and state intervention that seeks to address all the challenges that are most likely to have some adverse effects on its success. The City is doing well so far with the provision of adequate infrastructure that is accompanied by bike-parking areas. However, an activation plan is required to inform people about the infrastructure that is put in place. This is because the infrastructure alone may not necessarily be sufficient to promote bicycling. A lack of understanding of what its purpose is may lead to bicycling infrastructure that becomes a white elephant.

The establishment of patrol and law enforcement for the biking lanes also shows the City's commitment in pushing the agenda of sustainable transport. That is, most of the work now relies on bridging the remaining gaps and advocating more strongly. Once all these can be achieved, the bicycling culture in the inner city of Johannesburg may be deemed feasible.

There is a need for the City to take into consideration the question that was raised (during the EcoMobility Festival Dialogues – Travel Demand Workshop that the researcher took part in) on which participants were calling for the City to reconsider promoting and protecting bicycling using cars through the JMPD. It might be worth a try to get patrollers on bicycles as this might stimulate potential cyclists to embark on bicycle trips.

Feasibility in terms of costs

The question of whether implementing a bicycling initiative is feasible in terms of costs has been tricky throughout the study. However, the GCRO representative took a stand point that if the bicycle lanes can enable the inner city of Johannesburg to cope with high population densities through the reduction of traffic congestion; and if they increase accessibility within the city then they are worth the money spent on them. However, it is also important to take note that the mission to achieve a bicycling culture cannot be fulfilled overnight (CoJ official B, 2015).

REFERENCE LIST

- Alex News (2014), Joburg to get more cycling lanes: More cycling lanes linking various areas in Joburg are expected in the next two years. Available: http://alexnews.co.za/34899/joburg-to-get-more-cycling-lanes/. Accessed: 20th Sep 2015.
- Batista, E.A.D., (2010), *Bicycle Sharing in Developing Countries: A Proposal Towards Sustainable Transportation in Brazilian Median Cities*, Royal Institute of Technology Stockholm.
- Beavon, K.S.O. (2001) *The Role of Transport in the Rise and Decline of the Johannesburg CBD, 1886-2001*, Pretoria: Department of Geography and Geoinformatics, University of Pretoria.
- Bhattacherjee, A. (2012) *Social Science Research: Principles, Methods, and Practices*, 2nd edition, Tampa, Florida: University of South Florida.
- Bickford, G., (2013), *Literature review on public transport and mobility in municipalities*, South African Cities Network, Johannesburg.
- Bogdan, R. and Biklen, S. K. (1992), *Qualitative Research for Education*, Allyn and Bacon, Boston.
- Carmona, M., Heath, T., Oc, T. and Tiesdell, S., (2003), *Public Spaces - Urban Spaces: The Dimensions of Urban Design*, Architectural Press, Oxford.
- City of Johannesburg (2009), Framework for Non-Motorised Transport.
- City of Johannesburg (undated), Joburg 2040 Growth and Development Strategy.
- City of Johannesburg, (2013), *Strategic Integrated Transport Plan Framework For The City of Joburg*, Draft for discussion.
- Climatemps (2014), Climate Graph for Johannesburg, South Africa. Available: www.johannesburg.climatemps.com/graph.php. Accessed: 23rd Sep 2015.
- CPT (undated), Bike Friendly Campaign. Available: http://www.bicyclecapetown.org/bike-friendly/. Accessed 20th Sep 2015.
- Creswell, J., (2009), *Qualitative, Quantitative, and Mixed Methods Approaches*, Los Angeles: Sage Publications.

- Culwick, C. (2014). Transitions to Non-Motorised Transport in Gauteng. In: Wray, C. and Gotz, G. *Mobility in the Gauteng City-Region*. Johannesburg: GCRO. p131 - 151.
- Curtis, K. and Dicks, R. (2010), Cape Town: Cycling City!, Available: http://www.bicycling.co.za/race-news/cape-town-cycling-city/. Accessed: 22nd Sep 2015.
- *Cycling-Inclusive Policy Development: A Handbook, Chapter 14* –, GIZ, Netherlands.
- Department of Transport (2008), *Draft National Non-Motorised Transport Policy*, Pretoria, South Africa.
- Department of Transport (2014), *Shova Kalula Presentation to NMT Conference31 October 2014*, South Africa.
- Donaldson, R., (2001), A modelforSouthAfricanUrbanDevelopmentinthe21st Century?, 20th South African Transport Conference South Africa, 16 – 20 July 2001 '*Meeting the Transport Challenges in Southern Africa*', Document Transformation Technologies.
- Easy Expat (2008), Geography of Johannesburg, Overview of South Africa. Available: http://www.easyexpat.com/en/guides/southafrica/johannesburg/overview/geography.htm. Accessed: 23rd Sep 2015.
- EcoMobility World Festival Team (2015), EcoMobility Dialogues 2015: 5 – 9 October 2015 Johannesburg, South Africa, Programme Book.
- EcoMobility World Festival Team (2015), *Johannesburg Shows The Way To Eco-friendly Transport*, Available: http://www.ecomobilityfestival.org/festival/. Accessed: 20th Aug 2015.
- EcoMobility World Festival Team (2015), *Transport Management Plan Pedestrians, cyclists and public transport users will be put first during the EcoMobile World Festival*. Available: http://www.ecomobilityfestival.org/transport-management-plan/. Accessed: 20th Aug 2015.
- European Communities (2007), *Sustainable Urban Transport Plans: Preparatory Document in relation to the Thematic Strategy on the Urban Environment*, Luxembourg, Europe.
- European Environmental Agency (1997), Sustainable Development for Local Authorities, *Environmental Issues Series*, No. 5, pp. 44 – 66.

- Fripp, C. (2015), Expect traffic chaos during Joburg's EcoMobility festival. Available: http://www.htxt.co.za/2015/07/30/expect-traffic-chaos-during-joburgs-ecomobility-festival/. Accessed: 20th Oct 2015.
- Gauteng Department of Roads and Transport (2013), *Gauteng 25 – Year Integrated Transport Master Plan*: November 2013 – Final Plan, Johannesburg, South Africa.
- Gautrain (2015), Why rapid rail?. Available: www.gautrain.co.za/about/about-gautrain/why-rapid-rail/. Accessed: 27th Oct 2015.
- German Partnership for Sustainable Mobility (2015), Sustainable Mobility – Made in Germany, GIZ, Germany.
- Global Alliance for EcoMobility, (undated), *Fact Sheet 1.1 WhatisEcoMobility?*, Available:http://www.ecomobility.org/fileadmin/template/project_templates/ecomobility/files/Publications/What_is_EcoMobility.pdf. Accessed: 19th Aug 2015.
- Godefrooij, T. and Schepel, S. (2010), *Co-benefits of Cycling-inclusive Planning and Promotion*, World Bank, Netherlands.
- Godefrooij, T., Jong, H., and Rouwette, A. (2009). From car-based to people-centred cities. In Godefrooij, T., Pardo, C., and Sagaris, L. *Cycling-Inclusive Policy Development: A Handbook*. Netherlands: GIZ. p6 – 31.
- Goodland, R., (1995), The concept of environmental sustainability, *Annual Review of Ecological Systems*, vol. 26, pp. 1- 24.
- Greene, D.L. and Wegener, M. (1997), Sustainable transport, *Journal of Transport Geography*, 5(3), 177 – 190.
- Habib, M.A. and Islamia, A., (2007), Towards A Sustainable Urban Environment Approach (SUEMA): Incorporating Environmental Management with Strategic Environmental Assessment (SEA), *Journal of Environmental Planning and Management*, 50(2), pp. 257 – 270.
- Hamilton-Baillie, B., (2008), Towards shared space, *Urban Design International*, Vol. 13, pp. 130 – 138.
- Handy, S., (2006), 'The road less driven, (Longer View)', *Journal of American Planning Association*, 274(5).

- Haughton, G. (1997), Developing sustainable urban development models. *Cities*. 14 (4), 189-195.
- Haughton, H. and Hunter, C., (1994), *Sustainable Cities*, Kingsley, London.
- Heinen, E., Van Wee, B. and Maat, K., (2010), Commuting by Bicycle: An Overview of the Literature, *Transport Reviews*, 30(1), pp. 59–96.
- ICLEI (undated), Who We Are. Available: http://www.iclei.org/about/who-is-iclei.html. Accessed: 20th Aug 2015.
- Jacobs, J. (1961), *The Death And Life Of Great American Cities*, Random House, New York.
- Jennings, G. (2011), *A challenge shared: Is South Africa ready for a public bicycle system?*, Southern African Transport Conference(SATC 2011), Document Transformation Technologies, Pretoria.
- Jensen, S.U., (2000), *Collection of Cycle Concepts*, Danish Road Directorate, Copenhagen.
- Jong, H., and Rouwette, A. (2009), Introduction: Learning from others 'successes and failures. In: Godefrooij, T., Pardo, C., and Sagaris, L. *Cycling-Inclusive Policy Development: A Handbook*. Netherlands: GIZ. p1 – 5.
- JUCA, (undated), Streets Alive – 4 October. Available: http://www.juca.org.za. Accessed: 1st Oct 2015.
- Kamau, D., (2007) 'Transportation Policy, Planning and Implementation Case Study', Southern African Transport Conference (SATC 2007), Pretoria, South Africa.
- Kim, P. and Dumitrescu, E., (2010), *Share the Road: An Investment in Walking and Cycling Road Infrastructure*, UNEP and FIA Foundation, Nairobi.
- Krizek, K.J. and Roland, R.W., (2005), What is at the end of the road? Understanding discontinuities of on-street bicycle lanes in urban settings, *Transportation Research*, Part D No. 10, pp. 55–68.
- Lowe, M.D., (1990), *Alternatives to the Automobile: Transport for Livable Cities, Worldwatch Paper 98*, Worldwatch Institute, Washington.

- Lynch, K., (1960), "*The Image of the Environmentand the City Image and Its Elements*" from *The Image of the City* in Larice, M. and Macdonald, E. (2007), The Urban Design Reader, Routlege, London.
- Marshall, W.E and Garrick, N.W. (2011), Evidence on Why Bike-Friendly Cities Are Safer for All Road Users, *Environmental Practice,* 13, 16–27.
- May, T. (2001), *Social Research: Issues, Methods and Process,* Third Edition: Open University Press, Maidenhead.
- Moody, M., (2012), *The case for transition to a sustainable transport system in Stellenbosch*, Masters, Faculty of Economic and Management Sciences, School of Public Leadership, University of Stellenbosch.
- Mouton, J. (2001), *How to Succeed in you Master's and Doctoral Studies: A South African Guide and Resource Book* , Van Schaik Publishers, Pretoria.
- Natrasony, S.M. and Alexander, D. (undated). *The rise of Modernist and the Decline of Place: The Case of Surrey City Centre, Canada*, Simon Fraser University, Vancouver.
- Nelson, A. and Scholar, V. (2007), *Livable Copenhagen: The Design of a Bicycle City*, Copenhagen: Center for Public Space Research.
- New South Wales Government, (2004), *Planning guidelines for walking and cycling*, Department of Infrastructure, Planning and Natural Resources, Australia.
- New South Wales Roads and Traffic Authority (2005), *NSW bicycle guidelines*, RTA, Australia.
- Njogu. M., (2015), Bike Lanes for Bikes. Available: http://www.juca.org.za/?p=885. Accessed: 1st Oct 2015.
- Njogu. M., (2015), The bike trains are back: calling for bike train leaders. Available: http://www.juca.org.za/?p=904. Accessed: 1st Oct 2015.
- Nkurunziza, A., (2013), *Sustainable Transport in Dar-es-Salaam: The Potential for BRT and Cycling from a User Perspective,* ITC Printing Department, University of Twente.
- OECD (1997), Towards Sustainable Transportation: The Vancouver Conference, 24-27 March 1996.

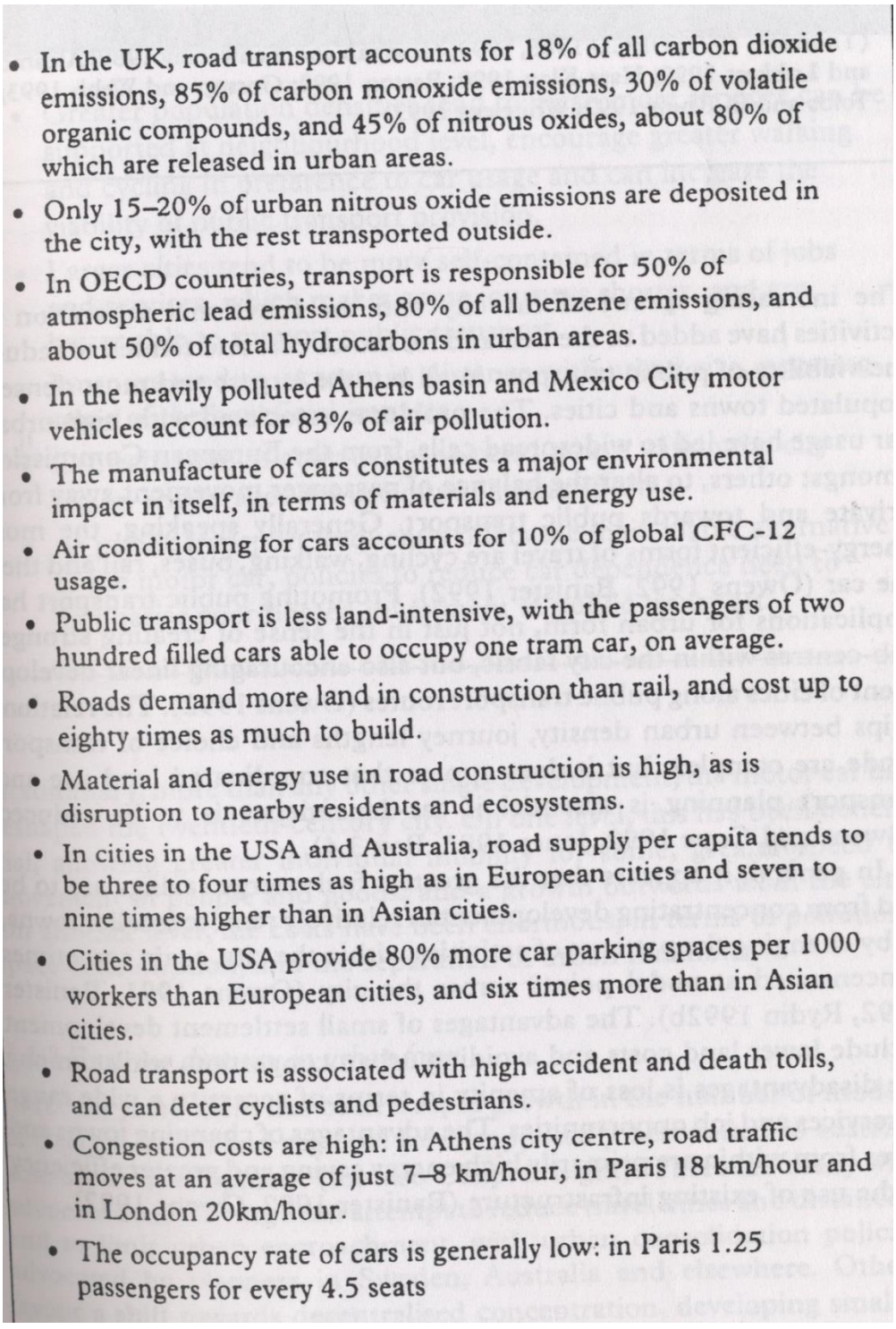
- Oosterhuis, H., (2014), Bicycle Research between Bicycle Policies and Bicycle Culture, *Mobility in History*, Volume 5, pp. 20–36.
- Pardo, C. and Sagaris, L. (2009). Building a multimodal transport system: Integration cycling and public transportation. In: Godefrooij, T., Pardo, C., and Sagaris, L. *Cycling-Inclusive Policy Development: A Handbook*. Netherlands: GIZ. p124-140.
- Pardo, C.F., (undated), *Sustainable Urban Transport, Shanghai Manual* – A Guide for Sustainable Urban Development in the 21st Century, Shanghai, China.
- Patton, M.C. and Cochran, M., (2002), *A Guide to Using Qualitative Research Methodology*, Medecins Sans Frontieres, U.K.
- Peñalosa, E. 2006. *The role of transport in urban development policy*. GTZ Sourcebooks. Germany: GTZ.
- Pro Consumer (2012), Behaviour change program. Available: http://proconsumerr.blogspot.co.za/2012/03/mind-maps.html. Accessed: 9th Oct 2015.
- Pucher, J. and Buehler, R., (2008) 'Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany', *Transport Reviews*, vol. 28, no. 4, pp. 495-528.
- Pucher, J. and Buehler, R., (2009) 'Integrating Bicycling and Public Transport in North America', *Journal of Public Transportation*, vol. 12, no. 3, pp. 79 – 104.
- Pucher, J., and Buehler, R., (2011), Sustainable transport in Freiburg: Lessons from Germany's Environmental Capital, *International Journal of Sustainable Transport*, Vol. 5, pp. 43 – 70.
- Rahim, H. (2014), *The social and economic effects of the Rea Vaya Bus Rapid Transit System (BRT) in the Gauteng Province*, Master of Science, University Of South Africa.
- Samuels, S., (2014), Joburg to get more cycling lanes. Available: http://fourwaysreview.co.za/182452/joburg-to-get-more-cycling-lanes/. Accessed: 1st Oct 2015.
- SAPA (2014), IOL News: Gauteng *has non-motorised transport plan*. Available: http://www.iol.co.za/news/southafrica/gauteng/gautenghasnonmotorisedtransportplan1.1668888#.VO5UJ_nF9e8. Accessed: 20th Aug 2015.
- Satterthwaite, D. (1997), Sustainable cities or cities that contribute to sustainable development?, *Urban Studies*, 34(10), 1667 – 1691.

- Schepel, S. and Zuidgeest, M. (2009), Ideas that shape urban form – and how urban form shapes us. In: Godefrooij, T., Pardo, C., and Sagaris, L. *Cycling-Inclusive Policy Development: A Handbook*. Netherlands: GIZ, pp. 32-46.
- Seftel, L. (2012), *Promotion of Public Transport, Walking and Cycling: Lessons From Johannesburg*, Conference CODATU XV, Ethiopia.
- Segooa, T. (2014). *An Exploration of the Social Production of Vilakazi Street as a Social Space*. Honours in Urban and Regional Planning. School of Architecture and Planning, University of the Witwatersrand, Johannesburg.
- Smith, J., (2015), Has Jozi put the lanes before the cycles?. Available: http://www.iol.co.za/the-star/has-jozi-put-the-lanes-before-the-cycles-1.1830550#.Vg0eZGcS6So. Accessed: 1st Oct 2015.
- South African National DoT, (2006), 'Moving South Africa: A Transport Strategy for 2020'
- South African National DoT, (2009), 'Draft National Non-Motorised Transport Policy'
- Sustainable Mobility (2011), THE BICYCLE: KING OF SUSTAINABLE MOBILITY. Available: http://www.sustainable-mobility.org/resource-centre/month-issue/the-bicycle-king-of-sustainable-mobility.html. Accessed: 25th Aug 2015.
- The Republic of South Africa, (1996), The Constitution of the Republic of South Africa Act 108 of 1996
- Topographic-map.com (undated), Johannesburg. Available: http://en-za.topographic-map.com/places/Johannesburg-7811367/. Accessed: 25th Sep 2015.
- United Nations (2013), *World Economic and Social Survey 2013: Sustainable Development Challenges*, United Nations, New York.
- Urry, J. (2004), The 'System' of Automobility. *Theory, Culture & Society*. 21(4/5), 25 – 39.
- Venter, C. and Badenhorst, W. (2014). 2011 GCRO Quality of Life Survey: Analysis of Transport Data. In: Wray, C. and Gotz, G. *Mobility in the Gauteng City-Region*. Johannesburg: GCRO. p15 - 57.
- Waal, L. (undated), *The Bicycle in southern Africa*, Pedal Power Foundation of South Africa, Cape Town.

- Weakley, D. and Bickford, G. (2015), *Transport and urban Development: Two Studies from Johannesburg*, GCRO, Johannesburg.
- Williamson, K., (2005), *Spatial Planning, Urban Form and Sustainable Transport*, Ashgate, UK.
- Wittink, R. (2009), Education, awareness building and advocacy. In: Godefrooij, T., Pardo, C., and Sagaris, L. *Cycling-Inclusive Policy Development: A Handbook*. Netherlands: GIZ. p.176-182.
- Wright, L. and Montezuma, R. (2004), Reclaiming public space: the environmental, economic and social impacts of Bogotá's transformation, *Paper delivered at Walk 21*, Copenhagen.
- Yin, R. (1994), *Case Study Research Design and Methods*, Second Edition, Sage, Thousand Oaks.

APPENDICES A

ANNEXURE 1



- In the UK, road transport accounts for 18% of all carbon dioxide emissions, 85% of carbon monoxide emissions, 30% of volatile organic compounds, and 45% of nitrous oxides, about 80% of which are released in urban areas.
- Only 15–20% of urban nitrous oxide emissions are deposited in the city, with the rest transported outside.
- In OECD countries, transport is responsible for 50% of atmospheric lead emissions, 80% of all benzene emissions, and about 50% of total hydrocarbons in urban areas.
- In the heavily polluted Athens basin and Mexico City motor vehicles account for 83% of air pollution.
- The manufacture of cars constitutes a major environmental impact in itself, in terms of materials and energy use.
- Air conditioning for cars accounts for 10% of global CFC-12 usage.
- Public transport is less land-intensive, with the passengers of two hundred filled cars able to occupy one tram car, on average.
- Roads demand more land in construction than rail, and cost up to eighty times as much to build.
- Material and energy use in road construction is high, as is disruption to nearby residents and ecosystems.
- In cities in the USA and Australia, road supply per capita tends to be three to four times as high as in European cities and seven to nine times higher than in Asian cities.
- Cities in the USA provide 80% more car parking spaces per 1000 workers than European cities, and six times more than in Asian cities.
- Road transport is associated with high accident and death tolls, and can deter cyclists and pedestrians.
- Congestion costs are high: in Athens city centre, road traffic moves at an average of just 7–8 km/hour, in Paris 18 km/hour and in London 20km/hour.
- The occupancy rate of cars is generally low: in Paris 1.25 passengers for every 4.5 seats

Car-Related Urban Problems adopted from (Haughton and Hunter, 1994)

APPENDICES B

ANNEXURE 1: PARTICIPATION INFORMATION SHEET

The role of bicycling in moving away from the automobile-centric city

The case of Johannesburg

Dear participant,

My name is Dineo Lekgothoane, I am currently registered for BSc in Urban and Regional Planning with Honours degree at the School of Architecture and Planning, University of the Witwatersrand. I am working on my research which is more of a feasibility study of the City of Johannesburg's bicycling initiative. I hereby invite you to participate in this study as your input will be worthwhile.

The study is briefly explained below:

Research topic

"The role of bicycling in moving away from the automobile-centric city: The case of Johannesburg"

Background

Johannesburg's built environment conforms to the modernist planning principles, and remains automobile-centric in nature. This is evident is the way in which it was designed, with skyscrapers in the city centre and the accompanying automobile oriented street layouts.

The apartheid regime imposed higher levels of social inequalities and the fragmentation of the city through modernist planning approaches that sought to segregate racial groups. Hence the previously disadvantaged communities remain at peripheral locations, with the mining belts acting as a barrier between these areas and the city centre. Consequently, the reliance on freeways was inevitable, leaving the vast majority of people with no choice but to invest in private car ownership. This automobile-centric city does not have space for pedestrians and bicyclists as they were not considered in the initial building of the city.

However, it has been recognized that the City of Johannesburg is implementing bicycle lanes in some parts of the city. This stimulated the interests of this study, and hence the need to delve into the feasibility of the initiative.

The research question is as follows:

How feasible is the City's plan to shift towards a bicycling initiative?

Your engagement in the study is voluntary, and you are free to withdraw from it at any given time when you feel the need to do so. Your role is to respond to a number of questions stemming from the main research question. The information obtained from the interviews will be highly confidential and anonymity is guaranteed. The data will be used to formulate an academic research report which will be submitted to the School of Architecture and Planning at the university, as part of fulfilling the requirements of the degree mentioned above.

Yours sincerely,

Dineo Lekgothoane

ANNEXURE2: CONSENT FORM

The role of bicycling in moving away from the automobile-centric city

The case of Johannesburg

Researcher's information

Name: Dineo Lekgothoane

Email address: dineolekgothoane14@gmail.com

Please tick the box

1. I confirm that I have read and understood the information sheet for the above study and have had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason. ☐

3. I agree to take part in the above study. ☐

4. I agree to the interview being audio recorded ☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

APPENDICES C

ANNEXURE 1: Interview questionnaire for government officials

Personal profile

1. Current Occupation
2. Work Experience related to transport
3. What are you currently involved in with regards to NMTs?

The City's Bicycling Initiative

1. What is your perspective on cycling in Johannesburg?
2. What triggered the need to establish a bicycling initiative in Johannesburg?
3. How does bicycling contribute to the development of Johannesburg as a sustainable city?
4. What are the techniques that can be used to promote cycling in Johannesburg?
5. Do you think the City's bicycling initiative will stimulates non-bicyclists' interest?
6. Do you think the City is doing enough to change the perceptions around bicycling as an activity?
7. If not, what can be done to ensure that this is achieved?
8. Is the initiative feasible in terms of costs?
9. What are the (possible) challenges in implementing the bicycling initiative in the City so far?
10. Are there areas which you find should be prioritised in terms of NMT interventions?
11. Are there any traffic laws enacted to ensure cyclists' safety and also to enforce illegal parking?
12. In your view, should we blame the fact that the city is dysfunctional on the 'car' or the 'planners' or both?

Concluding remarks and recommendations

ANNEXURE 2: Interview questionnaire for city residents

Personal profile

1. How old are you?
2. What do you do for living?
3. Where do you reside in the inner city?

Mobility

4. Where do you study/work?
5. What mode of transport do you use on a daily basis?
6. Is it sustainable in terms of costs?

Bicycle status

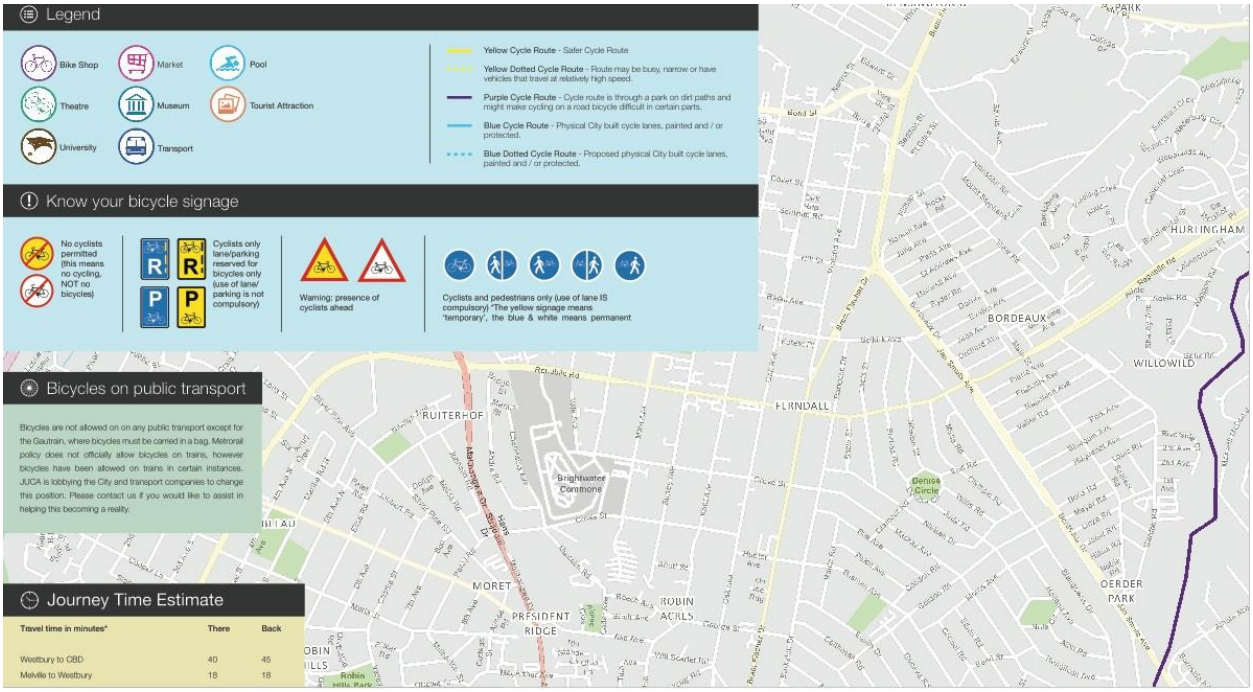
7. What do you think of the bicycle as a mode of transport?
8. Do you cycle/own a bicycle?
9. If, so how and when do you do you cycle?
10. If not, why?

Johannesburg bicycling initiative

11. Are you aware of the City's bicycling initiative?
12. What are your thoughts on that?
13. Do you see yourself riding on the bike lanes provided one day?
14. If not, why?
15. Do you think it will reduce congestion?
16. What other tactics do you think the City must consider using to promote bicycle in Johannesburg?

APPENDICES D

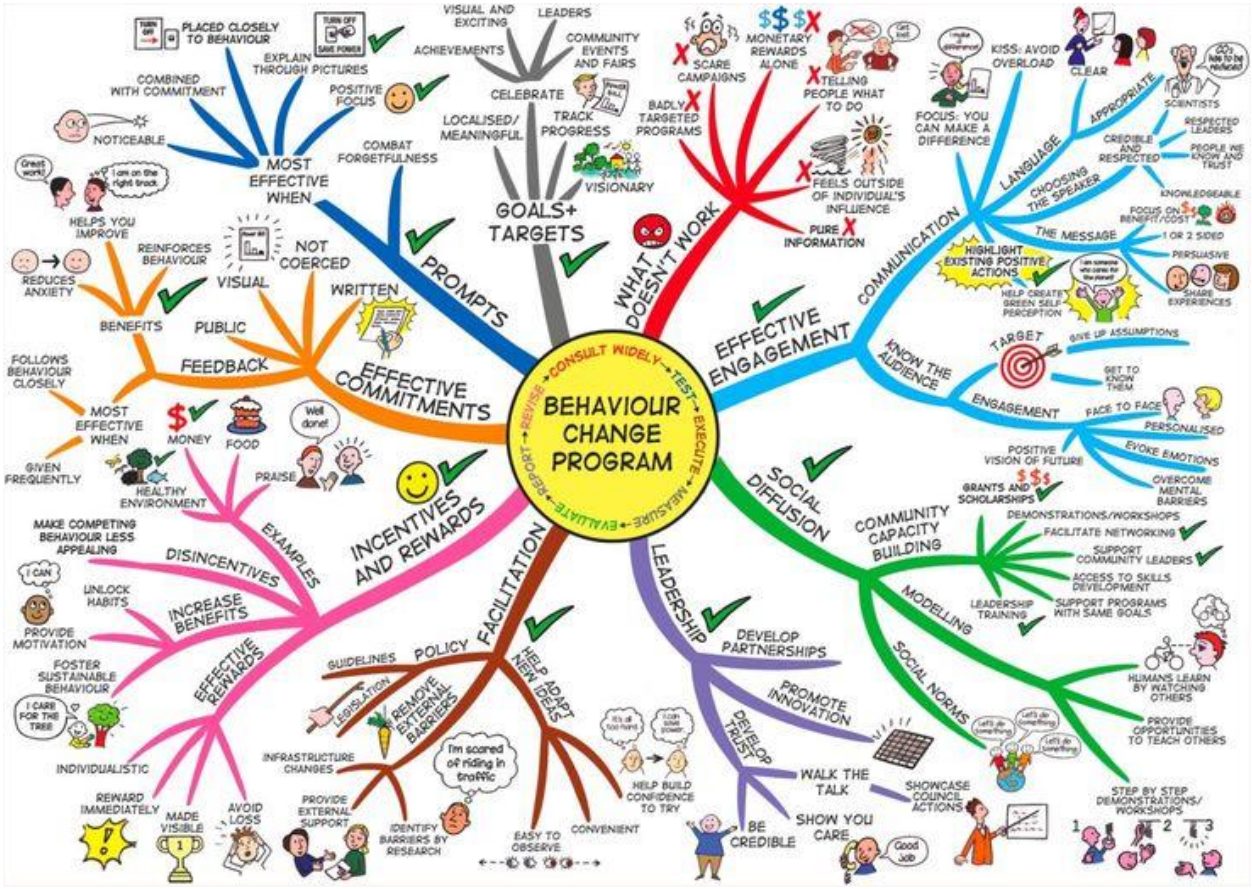
ANNEXURE 1: A snapshot of the JUCA Commuter Cycle Map



Commuter Cycle Map (JUCA, undated).

APPENDICES E

ANNEXURE 1: Behaviour change program



Source: (Pro Consumer, 2012)