



Impact of the BRT on Accessibility to Employment Opportunities; Case
of Witsand: Atlantis, Cape Town

By

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Dedication

My heart and affection go out to my loved ones. Thank you for your love, support, and financial help that has kept me going until now. Be blessed.

2 Corinthians 12 vs. 9:

"My grace is sufficient for you, for my power is made perfect in weakness."

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Thank you!

Plagiarism Declaration

PLAGIARISM DECLARATION

"I, Sharon Tsitsi Marimira, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorize the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever."

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Abstract

Witsand is a settlement located 40km from Cape Town Civic Centre making it a peripheral area within Cape Town. The community faced social exclusion in that, the area had no direct public transport services linking them to the city centre. They had no train services and had to rely on minibus taxis that connected them to Dunoon and from there interconnected to different areas of employment. As such they also suffered from economic exclusion because they had to pay higher fares as minibus fares charge higher costs than conventional buses. The residents had to endure long commute distances to and from work and consequently spent significant amounts of their time traveling.

Cape Town Municipality created “the Bus Rapid Transit (BRT)” system MyCiTi, to help address the inequality issues within the city for low-income settlement. Therefore, the research aimed to evaluate the impact of the BRT on accessibility to employment opportunities for the residents in Witsand, Atlantis in Cape Town. The study is based on Witsand as it met the criterion of being a low-income settlement and being located at the urban fringes of Cape Town. Household surveys, in-person observations, and computer research (Geographical Information Systems, GIS) were used to gather the data for the study.

The study shows that, before MyCiTi started to operate in the area, most of the residents restricted their employment areas to local employment opportunities like Atlantis centre, Atlantis industrial and Witsand. Currently, the BRT has provided people with various possibilities to access jobs in the Central Business District or civic centre and other sub-nodes, such as Century City, and Table View because the routes take inhabitants straight to these nodes without the need to interchange to other modes. There has been growth along the northern corridor of Cape Town in residential and commercial activities. MyCiTi fares are more affordable than different options of transportation like Sibanye and minibus taxis, and this has arguably enabled the residents to travel more, to areas of employment and even have multiple jobs. Furthermore, MyCiTi is dependable and safe as the system has reliable bus schedules making it easier for commuters to plan their journeys and be more flexible. However, in terms of travel time, there are no changes from before MyCiTi was developed. This is because the spatial structure of Cape Town encourages long travel distances. The thesis was case based and as such the findings may not be generalisable. The thesis seeks to add to the debate of creating equitable inclusive cities that are accessible for both low- and high-income residents.

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Abbreviations

BEPP – Built Environment Performance Plan

BRT – Bus Rapid Transit

CBD – Central Business District

CITP – Comprehensive Integrated Transport Plan

CoCT – City of Cape Town

DOT – Department of Transport

GIS – Geographical Information System

IDP – Integrated Development Plan

IRT – Integrated Rapid Transit

NHTS – National Household Travel Survey

TCT – Transport for Cape Town

TDA – Transport and Urban Development Authority

TOD – Transit Oriented Development

Chapter 1: Introduction

1.1 Preamble

This section offers an outline on spatial mismatch, and its effect on access to employment opportunities. Additionally, it provides detailed information that places the idea of “the bus rapid transit (BRT)” and its impact on accessibility in context. The chapter also outlines the need to undertake the study by highlighting its scope, goals, questions, and proposition. The limitations, rationale and structure of the study are also outlined.

Many developing cities in Southern Africa have a spatial mismatch form of settlement segregation and discrimination based on ethnicity and wealth, which have caused limited employment opportunities and significant transportation expenses for the lower-class residents (Hellerstein et al., 2008). Consequently, poor families are compelled to reside on the borders of towns or metropolises and spend disproportionate amount of their income on transportation. Transportation-related social exclusion is one of the issues that individuals living on the outskirts of cities are confronted with. The BRT infrastructures have been established to ease this problem towards improving accessibility for the communities and provide efficient transport systems. Levinson et al. (2003) define it as an integrated bus transit system with services, facilities, and amenities aimed at enhancing public transportation reliability and speed.

1.2 Background to the study

1.2.1 Spatial Mismatch

The percentage of people living in poverty, especially those living on the outskirts of urban and metropolitan centers in developing countries, has risen and continues to rise (Cohen, 2006, Jargowsky, 2003, Massey, 1996). Following the premise that land is more affordable or inexpensive on the outskirts than in the inner city, the poor people in developing countries prefer to live on the outskirts of cities (Chaudhuri, 2015, Caldeira, 2017). Countries in Southern Africa like Zimbabwe, Zambia, and South Africa, were developed along a segregated planning framework from British colonization ("unequal" urban spatial form), resulting in low-income residential neighborhoods being located far from the city core, and are disconnected from areas of work opportunities, resulting in a spatial mismatch (Pieterse, 2019, Diep et al., 2019, Munzwa and Wellington, 2010, Sinclair-Smith and Turok, 2012, Dewar, 2002, Turok, 2001). According to the spatial mismatch hypothesis (SMH), the isolation of job regions from where low-income employees live led to high unemployment and low earnings for the residents (Ihlanfeldt, 2002, Gobillon et al., 2007, Gobillon and Selod, 2012, Turok, 2001).

The urban outskirts have inexpensive rents, making them a cheap housing option for low-income families (Bunker and Houston, 2003). Furthermore, they argue that because of their remoteness to

the City Centre and its socioeconomic activities, individuals at peripheral districts struggle to find affordable transportation to these activities, which are typically located in the city center. Poor transportation therefore makes it difficult to access better services due to costly services and extended travel times (Sinclair-Smith and Turok, 2012, 2013). Haas et al. (2006) states that residents must weigh the costs of housing and transportation when deciding where to settle down resulting in a trade-off. The trade-off is based on that by settling in the outskirts, rent will be low but transportation to the city center will be expensive. Whereas, settling near the city's core, the rent will be costly, but transportation will be inexpensive. As a result, the less affluent are forced to choose between transportation costs and rent for housing.

1.2.2 Transportation-related social exclusion

Keeping all other factors constant (*certeteris paribus*), transportation social exclusion maintains that some of the causes of poverty for urban inhabitants are the consequences of households being forced to pay more transportation charges than they can afford (Lucas, 2019, Lucas et al., 2016). Poggi (2007) made the point, which was later buttressed by Falavigna and Hernandez (2016) that “social exclusion is neither a static nor a discrete process, but is related to time, power and space that involve mutable levels of exclusion, as essential resources are traded off to respond to dimensions of social exclusion”. Thus, low-cost housing in urban peripheries have limited accessibility and reduced mobility, (Kenyon, 2006, Church et al., 2000, Titheridge et al., 2014, Lucas et al., 2016).

Poverty is aggravated by social exclusion, in that it results in being cut off from economic prospects added to the limited income, reduced human capacities, and the ability to amass possessions (Hanmer et al., 2000). Kunieda and Gauthier (2007) state that "The time and money that the poor spend satisfying mobility demands inhibits low-income families from amassing assets that would pull them out of poverty." This may be attributed to that residents spent an unsustainable percentage of their income on transportation as cities grew, which has negative consequences for the poor (OECD, 2011).

1.2.3 The Bus Rapid Transit (BRT) System

The BRT networks were developed towards being a strategy to alleviate poverty among the urban people. The BRT is a mass transit option that addresses social, environmental, and economic sustainability concerns. BRT improved access to those who resided on the outskirts of cities at a reasonable cost (Tsivanidis, 2018, Vermeiren et al., 2015). Scholl et al. (2019) states that one of the primary reasons governments invest in BRT is to improve access to jobs and health care, as well as to reduce the geographical and public imbalances that exist in cities.

Authorities have spent significant portions of their budget on public transport infrastructure to increase accessibility and affordability to decrease these inequalities mentioned earlier, (Guzman and Oviedo, 2018, Carruthers et al., 2005, Lucas, 2006, Serebrisky et al., 2009, Ahmed et al., 2008). BRT systems such as MyCiTi, the Rea Vaya system, and the Tshwane BRT in South Africa,

and the Dar Rapid Transit Agency (DART) in Tanzania, are examples of such developed BRT systems in Africa. BRT was implemented as part of Transport Oriented Development (TOD), or Transit Oriented Development (Cervero, 2013). Curitiba, Brazil, has a TOD in the form of the Rede Integrada de Transporte, a BRT that was implemented in 1974 (Hook, 2005). The system directs physical expansion along its linear corridors, lowering transportation costs and increasing access to commercial activities for low-income communities on the outskirts (Hrelja et al., 2020). The BRT strives to ameliorate urban transportation issues in some developing countries, such as South Africa and Tanzania, as a retrofit that corrects the segregated urban spatial forms that are a legacy of colonialism (Nelson, 2021, Harber, 2020, Strydom, 2010).

Carrigan et al. (2013) described the BRT as an "effective public transportation option that offers capacity and speed at a reduced capital cost than urban rail". The BRT is a coordinated mass transit system that operates on dedicated right-of-way lanes and connects various types of transportation within a town (Wright, 2004, Grava, 2003). Reduced travel times, enhanced safety, higher capacity, and improved accessibility at an affordable ticket with less pollution are the key goals of the system (Grava, 2003). As a result, it has become a standard means of transportation in cities around the world, with over 166 cities across six continents adopting it (Shah and Adhvaryu, 2016, Shah et al., 2020). It was developed as a sustainable mode of transportation that may cut global transportation emissions while also providing affordable transportation to the urban poor, especially those living on the outskirts of cities (Hidalgo and Hermann, 2004, Hidalgo and Yepes, 2005, Carrigan et al., 2011, Hidalgo and Huizenga, 2013, Lionjanga and Venter, 2018).

Cities such as Bogota, Lagos, Curitiba, and Dar Salaam have had remarkable success using BRT. The number of passenger journeys per household has increased dramatically in nations where BRT has been implemented (Wright, 2011). People on the outskirts of these cities now have access to dependable, safe, and economical transportation (Maunganidze, 2011). This approach increased affordable access to key services and lowered the amount of money spent on transportation (Scholl et al., 2016, Linovski et al., 2018). Kain (1992) had made the point which was later buttressed by Boisjoly and Yengoh (2017) that the BRT opened job markets that were previously limited to all those who are secluded and live far away from them, expediting their employability to formalized jobs, enhancing their financial welfare, and allowing them to invest in property. Since the BRT is new to public transportation systems, it was necessary to expose the subject to a wide range of audiences, including urban transportation `strategic decision-makers,` for them to fully appreciate its cost, usefulness, and ramifications (Satiennam et al., 2006).

The influence of BRT system and how it improved access to work prospects, on the other hand, is quite debatable (Scholl et al., 2019). Much of the literature is focused on demonstrating that those who live near BRT stations gain the most from greater access to work because they have access to the main trunk systems, according to (Scholl et al., 2016, Scholl et al., 2019, Dutta and Henze, 2015). These are typically regions near the city, where job opportunities are plentiful. However, there is very little literature that shows how the system benefits the urban poor on the periphery of cities, (Rayle, 2017). This research, therefore, seeks to explore how the BRT system

developed in Cape Town has enhanced access to work prospects for residents living on the outskirts of the city (Witsand for this study).

1.3 Towards the research Problem

Transport related social exclusion is when individuals or communities are obstructed from taking part within socio-economic activities of the city. This is due to “reduced accessibility to opportunities, services and social networks owing in part or whole to insufficient mobility in the society”, as defined by (Kenyon, 2003). Delbosc and Currie (2011) state that the remoteness of low-income settlements has had a detrimental effect on their welfare because it prevented them from properly participating and contributing to the wider community socioeconomically. What aggravates the issue for residents, particularly in developing nations, is the availability of substitute modes of transportation known as minibus taxis, which operate by overcharging residents for rides to vital services (Kumar, 2011). For instance, families in Dar es Salaam spend about 30% of their monthly income on transportation, whereas Manila and Delhi spend between 20 and 25% (Duranton and Guerra, 2016). Scholl et al. (2019) argues that “the lack of access to reasonably priced and effective transport creates social exclusion, hampering access to employment opportunities.”

Scholars have noted the construction of the BRT as the reason for an increased accessibility, thus it portrays a pronounced position towards the reduction of marginalization in the community, (Hernandez and Titheridge, 2016, Ochoa-Covarrubias et al., 2021, Bocarejo S and Oviedo H, 2012). Residents living inside the BRT's region of impact are believed to have greater options for official formal employment, increased wages, and prospective wealth accumulation, noted by (Scholl et al., 2019). Thus, this arguably provides a prospective gain for settlements located at the urban fringes of Cape Town like Atlantis, Witsand, Strand and Fish Hoek.

Since some low and middle-income households do not own cars, they rely on public transportation to get around the city (Venter, 2013, Venter et al., 2018). As a result, the pricing of such services, as well as their degree of accessibility, became critical for the standard South African resident. The implementation of BRT in Cape Town's Witsand neighborhood provided a chance to investigate how efficient, regulated public transportation could assist alleviate the cost of spatial mismatch. As a result, this research aids to assess how the BRT has influenced accessibility to employment opportunities for the residents in Witsand, Cape Town.

Multiple research projects have examined and focused on the BRT system's benefits to locations inside the MyCiTi network's primary tracks, as well as how it was deployed. There has not been much focus on the consequences of its management in places as far afield as Witsand. Therefore, the study took a step away from viewing the BRT as merely a transitory element aimed at facilitating movement, but instead examining its shortcomings in addressing issues of geographical deprivation that have been common in most portions of Southern Africa's large cities.

1.3.1 Context to the problem

Given Witsand is situated along the urban boundary, it was designated here as “the case study.” It is situated more than forty kilometres from the city centre. It is located at the periphery of Cape Town and suffers from the negative impacts of transport related social exclusion. Hence, to access areas of employment, the residents must take a long trip and must pay high transportation costs. According to Miller (2018) and Transport for Cape Town (2015a) the situation came to a point whereby low-income households had to use 40% of their incomes towards transport monthly for work or employment related journeys. Gauthier and Weinstock (2010) argues that the City of Cape Town developed MyCiTi to “redress these legacy issues and provide rapid, high-quality transit services to those most disadvantaged by apartheid planning.”

1.4 Research Problem

Residents of Witsand in Cape Town located at the city's periphery were obligated to pay a lot of money for transportation and occasionally some were forced to walk long distances to use the inadequate public transportation options supplied. Without effective, dependable, and economical public transit, the residents had restricted access to job prospects. Thus, the development of BRT aimed to provide economical and reasonable public transportation to residents in such outlying areas. The BRT can be considered to have combined land use and transportation planning, (Milam and Luo, 2008, Cervero, 2013, Stojanovski, 2013, Ibraeva et al., 2020). However, because most researchers have concentrated on people living around the BRT major nodes, there are not many studies that have assessed the influence and effect of the bus rapid transit system on accessibility for residents located on the urban fringes, (Rodriguez and Vergel, 2013, Scholl et al., 2019, Hernandez and Dávila, 2016, Hernandez and Titheridge, 2016, Dodson et al., 2006, Blanco and Apaolaza, 2018, Arellana et al., 2021, Jaramillo et al., 2012, Martínez et al., 2018). There is, as a result limited information of how BRT system impacts access to employment opportunities for residents who live in settlements at the urban periphery. Scholl et al. (2019) states that peripheral cities already suffer from negative effects their location such as long travel distances and poor public transport services and as such studies are required to show how they improve access to employment opportunities for the urban poor.

The research problem may, therefore, be stated as: not much is known about the influence of “the BRT system” on accessibility to employment opportunities for residents who live at the city fringes such as Witsand, in Cape Town.

1.5 Research Question

- i. How has the BRT influenced accessibility to employment opportunities for the residents of Witsand, Cape Town?

1.6 Aim

- To assess how the BRT has influenced accessibility to employment opportunities for the residents in Witsand, Cape Town.

1.7 Objectives

1. To explore the characteristics of Witsand as a peripheral community at the periphery of greater Cape Town.
2. Identify the factors that contribute to the transportation and land-use-related challenges to access employment opportunities?
3. Assess how the BRT has improved accessibility to employment prospects for the residents of Witsand.
4. Examine the spatial distribution of job prospects available to residents of Witsand from the CBD and other decentralized nodes in the surrounding area.

1.8 Research Proposition

- i. Establishing a BRT system will make job opportunities more accessible to residents of Witsand, Cape Town.

1.9 Study area

Witsand, an informal community on the outskirts of Cape Town with a population of five thousand people, was selected as the research area for the study (GreenCape, 2020). It is located forty kilometers from the city's civic center or central business area (CBD), making it spatially separated from the city's socioeconomic activities. In addition, the city is bordered by dispersed commercial nodes such as Century City, Table view and Claremont, which serve as employment hubs for the neighboring towns. Several modes of public transportation are available in the neighborhood, including Sibanye, minibus taxis, Golden Arrow bus services, and the MyCiTi BRT system. In chapter 2, the study area Witsand was more thoroughly covered.

1.10 Research methods

A comprehensive literature review was conducted to guide data collection and analysis. Witsand was proposed to be appropriate as “the case study” as it is a community at the periphery of Cape Town for which the MyCiTi BRT system was introduced. The research analysed the travel patterns or behaviour of the residents before and after the development of the BRT network. The pragmatism research paradigm was employed for the study that made use of mixed method approach and relied on data collection techniques which include surveys of working age commuters of the study area, semi-structured interviews with key experts from the department of transport planning and MyCiTi representatives in City of Cape Town municipality, geographic information systems (GIS), direct observations, documentary, and photographic evidence.

The survey consists of a questionnaire that looks at the travel behaviour of the residents of Witsand from before and after the MyCiTi BRT system was introduced in the area. The data themes were generated using flexible pattern matching also known as template analysis, which generates themes or codes from literature and from the data as well. The data was analysed using Excel for the survey questionnaires and the manual method of coding was used for the interviews and conclusions were drawn.

1.11 Research Limitation

Several challenges were faced in conducting the research. The study is case based on Witsand and as such the findings cannot be generalizable to other areas that are not like the context area. The research is also retrospective research that requires respondents to recall events from the past. The challenge would be for the residents to remember specific travel behaviours from the past. However, if no major life changing events have in their lives, recalling their travel behavior from 10 years ago would not be a problem, (Behrens and Mistro, 2010).

The Covid nineteen pandemic laws brought on restrictions on the researcher with the need to adhere to social distancing protocols while interacting with the respondents. In addition, Covid-19 pandemic, resulted in numerous delayed administrative processes. Such as the application to get approval from the City municipality as the target key informants were not available.

1.12 Research ethics

Due to the research's emphasis on human behaviour, the researcher had to apply for the ethics clearance form from the ethics committee at the University. The researcher did not compromise or use the research material for any reason other than for academic purposes. Respondents were kept anonymous, and their names were not disclosed.

Before distributing the questionnaire, the respondents' permission was sought to verify their willingness to take part of the survey and interviews. Clearance to conduct focus group interviews, was also obtained with the city municipality and their personal details were kept private.

1.13 The Structure of the Study

Five chapters make up the dissertation, including.

Chapter 1: This chapter introduced the research by highlighting why it is imperative to pursue a study of this nature. The background showed that the spatial structure of Cape Town encourages long distance travelling for low-income residents located in Witsand and Atlantis. Due to this, traveling is long and expensive for the residents as they travel to areas of employment. This prompted the city authorities to develop MyCiTi BRT as a strategy to provide direct transport services to the residents. The chapter also included issues such as the research's purpose and goals, problem claim and the rationale for conducting the investigation.

Chapter 2: This chapter seeks to critically analyze academic literature on accessibility and spatial mismatch. This chapter is meant to understand the major debates concerning the theory of transport related social exclusion and the Bid Rent theory and their impact on access to employment opportunities. Other elements of the chapter include theoretical framework, legislative policy, and background on MyCiTi.

Chapter 3: The chapter showed how the study questions underscored in the first chapter of the research will be met. It will also include the research philosophy, strategy, approaches, and instruments. Additionally, it includes the tools that will be used to analyze the data, the study limitations, and ethics.

Chapter 4: The fourth chapter of the study will come after the fieldwork to interpret, analyze, and discuss the research findings. The data will be analyzed in terms of template analysis and a thorough evaluation and analysis of the results or findings will be given under a discussion.

Chapter 5: The research's last chapter will revisit the study objectives in line with the empirical findings. This will provide a premise in which the research proposition will be accepted or refuted. It will offer suggestions for further study and conclude the study.

1.14 Conclusion

In brief overview, the study aim, objectives, and problem statement were established in this section. It offered background information on accessibility difficulties and the research problem and inquiry to provide the outline for the research approach or design and evaluation of the data in subsequent chapters.

Chapter 2: Literature Review

2.1 Introduction

The former section established and launched the study and provided its background, including, issues such as the research's purpose and goals, problem claim and the rationale for conducting the investigation. It showed that the spatial structure of Cape Town encourages long distance travelling for low-income residents located in Witsand. This has consequently caused elevated travel costs and longer travel distances that the residents must face when they travel to areas of employment. This prompted the city authorities to develop MyCiTi BRT as a strategy to provide direct transport services to the residents.

This chapter will critically analyze academic literature on accessibility and spatial mismatch. This chapter is meant to understand the major debates concerning the theory of transport related social execution and its impact on access to employment opportunities. Other elements of the chapter include theoretical framework, legislative policy, and background to the MyCiTi BRT service. With reference to Cape Town, it examines the South African legal system governing transportation and land-use and MyCiTi background.

2.2 Accessibility

Accessibility is the most essential quality that relates to land use and transportation in the sense that transportation infrastructure promote engagement between geographically scattered land-use patterns, (Bertolini et al., 2005, Litman and Steele, 2017, Duranton and Guerra, 2016, Wegener, 2004). The development of settlements through the formation of various land uses will result in demand for transportation. Therefore, the connectivity of land uses determines their level of accessibility. In other words, it has an enormous impact on how far people travel, how many trips they take, how long they spend on each journey, and how they choose to travel. Therefore, accessibility impacts the travel time, distance, mode, and experience of the commuters. As a result, planning for land use and transportation jointly necessitates prioritizing accessibility (Wegener, 2004, Waddell et al., 2007, Dowling, 2005, Cervero, 2013).

Kelobonye et al. (2019) defines accessibility as "the total of land uses within a particular distance and travel time". It refers to the extent to which land uses are accessible to people for residential and non-residential purposes. Bocarejo S and Oviedo H (2012) defines accessibility as "the ease of reaching certain destinations inside a city given the quantity of accessible possibilities and the travel-related costs to reach those opportunities within time and economic constraints." The impact of these definitions is that compact developments that encourage increased land uses within short distances have higher accessibility as they encourage short travel distances and reduced travel times. Whereas sprawled developments have low accessibility due to increased travel distances and travel time, thus reducing their accessibility to employment opportunities.

Hurni (2006) argues that transport related social exclusion occurs because people reside in transport disadvantaged areas that is such areas have underprivileged public transport accessibility and "low levels of urban accessibility," In underprivileged public transport systems, its either the system is non-existent or are poorly functioning in terms of having low frequency. And the latter is based on the proximity of the settlement to the different goods and services. Preston and Rajé (2007) states that transport related social exclusion is not about having no socioeconomic activities to engage in but about having no access to link residents to economic activities. Thus, prior to the development of MyCiTi, Witsand suffered from low accessibility as the public transport system was deprived reducing their accessibility to employment opportunities.

Baum and Palmer (2002) describes accessibility as amenities provided to the public for them to gain access to social and economic opportunities, and are measured in terms of money, time, and risk associated with obtaining such opportunities. This raises several concerns which are the themes for analysis in chapter 4 and these include, travel time and distance to various activities, as well as transportation affordability, which is the financial burden placed on households when they decide to travel from one location to another to participate in various events (Brimoh and Onishi, 2007, Deng and Nelson, 2011, Deng and Srinivasan, 2016, Geurs and Van Wee, 2004). Thus, the more amenities made available to the settlements the more accessible the area is for the residents as they will spend less time travelling due to low travel distances. In addition, they will experience low transport costs, therefore, making them more accessible to employment opportunities.

Whereas other scholars view accessibility as the extent to which people can obtain goods and amenities that the public deem, they need to go facilitate their regular lives (Grengs et al., 2013, Bocarejo S and Oviedo H, 2012, Vaz and Venter, 2012, Venter, 2013, Jones, 2011) . Thus, this definition shows the importance of having crucial land-uses within the reach of the residents to enhance their welfare. Thus, if land-uses are far from their settlements (low accessibility), this will make it hard for them to go about their regular lives as they must pay higher travel costs and travel long distances. Hence, the above discourse validates the notion that accessibility is indeed at the heart of both the transportation-related social exclusion theory and the bid rent hypothesis.

According to the Social Exclusion Unit (2003) the following questions can assist to determine a location's accessibility:

- a. Do people have access to the services they need in a timely manner and at an affordable price?
- b. Are the services accessible within a reasonable traveling or driving distance?
- c. Does the general people know about public transit, and is it reliable and safe to use?
- d. Is the public transportation system physically accessible?

These questions show that accessibility is quantified in a variety of ways, also known as measures of accessibility and these include units of journey distance, travel time, and travel cost (Bocarejo S and Oviedo H, 2012, Echaniz et al., 2020, Lionjanga and Venter, 2018, Venter and Cross, 2014). There are four dimensions in which accessibility can be measured and these include Financial

which are travel expenses or costs; Distance, which is a physical barrier to getting to a location; Organizational which is how transportation infrastructure and facilities are structured and managed and temporal which is the availability of transportation and relates to which intervals it is available, and the amount of time spent traveling.(Casas, 2007, Casas and Delmelle, 2014, Levine, 2020, Lucas et al., 2016) Thus, these factors are the themes of analysis that were used in chapter 4.

2.2.1 Indicators of Accessibility

Bocarejo and Oviedo (2010) state that if accessibility is addressed in cities, it will move towards creating equitable transport systems and is set to act as a key indicator of social inclusion. There are different indicators that are used to indicate transport related social exclusion and such indicators can be used to show inclusion as well. For this study the indicators that will be used are based on accessibility. This is arguably because for peripheral settlements to be included in the socio-cultural and economic activities of the metropolis, employing accessibility as a yardstick is a good yardstick to measure their inclusion. Important to note is that these indicators of accessibility are also reflected in the transport related social exclusion theory as the measures that can also lead to inaccessibility.

Geurs and Ritsema (2001) argue that there are several measures of accessibility that include travel time, travel cost and effort. The indicators of accessibility are also used as themes for the analysis in chapter 4 and these include travel time and distance, cost of travel (affordability), and travel experience (reliability, information, and safety), (Braimoh and Onishi, 2007, Deng and Nelson, 2011, Deng and Srinivasan, 2016, Henning et al., 2011, Bocarejo S and Oviedo H, 2012, Páez et al., 2012, Litman, 2013, Litman and Steele, 2017, Litman, 2017, Venter and Cross, 2014, Lionjanga and Venter, 2018, Miller, 2018, Echaniz et al., 2020)

2.2.1.1 Travel cost or Affordability

Geurs and Ritsema van Eck (2001) state that monetary constraint is a major factor within transport related social exclusion as it leads to deprived participation in transport activities that connects the residents to socioeconomic activities. Rodrigue (2020) states that if transports costs rise by ten percent, this will reduce the volume of transport by twenty percent. Gwilliams (2017) and Currie (2009) state that many households are restricted from participating in transport activities because of their low incomes which causes them to either walk or substitute traveling for other services like health or education. Therefore, low-income levels greatly limit the mobility of the low-income residents. What further affects travel costs are household sizes. Lucas (2011) argues that higher household sizes further increase transport costs as there will be more people to travel within the household.

The Social Exclusion Unit (2003) states that "people should be able to get needed public transport services at a reasonable cost". Behrens and Venter (2005) state that the "government has stipulated in various policies like in the White Paper on National Transport Policy of 1996 and the National Land Transport Strategic Framework that households in South Africa should not spend more than 10% of their income on public transport". According to Chirisa and Muhomba (2013) most urban

poor households are trapped in a vicious cycle of poverty as they are not able to break out of the trap of poverty. This is because paying substantial amounts of money towards transport reduces the ability of the households to accumulate any assets. In addition to the above, it reduces their ability to spend on other essential activities such as taking their children to better schools, proper medical care, and shopping. Armstrong-Wright (1986) formulated a theory that "households should not pay more 10% to 15% of their income to transport as this would be unfair and discriminatory to them".

2.2.1.2 Travel time and distance

Haque et al. (2013) are of the view that, a key indicator of accessibility is travel time. Cervero and Wu (1998) state that the acceptable travel or commute distance to employment areas has been an area of debate for centuries among transport scholars. Kamruzzaman and Hine (2011) state that commuting long distances to access areas of employment can result in isolation and reduced engagements in social activities. Schwanen and Dijst (2002) argue that the average commute time also differs across countries such as Finland, where travellers spend an average of 20 minutes per day commuting to work while in Japan travellers spend 40 minutes per day. Stutzer and Frey (2008) state that in USA the average commute time in 2002 was 44 minutes. However, Kerr (2015) states that South Africa has a high commuting distance to work averaging from 56 minutes to 88 minutes per day.

Mass transit services should be provided at reasonable walking distance and time, Grengs et al. (2013). Milakis et al. (2015) notes that the acceptable travel time to work for most people is between 18 minutes (ideal) and 43 minutes (acceptable) before the tolerance levels of people decrease. Soczowka et al. (2021) state that total travel time is a combination of several components that include walking time to the bus stop, waiting time at the bus stop, in vehicle time, transfer time that includes, walk time, and transfer time and lastly egress time. Thus, the time taken to walk to a bus stop can increase total travel time, (Yigitcanlar et al., 2007a; Yigitcanlar et al., 2007b; Yigitcanlar et al., 2019). This reasonable amount to walk to a bus stop in South Africa, according to the CSIR (2000) is when "the walking distance to the nearest bus stop should not be more than 400 m from the furthest house which is about 5 to 8 minutes walking distance".

In public transport planning there is a problem known as the first and last mile problem. Kåresdotter et al. (2022) views "the first mile as the distance between public transport and the end-destination, and the last mile as the distance between the residence and public transport ". If the walking distance is too long this will affect the spatial accessibility of the area by increasing travel time and reducing the comfort of travelling, (Biba et al., 2010, Hagenauer and Helbich, 2017, Krygsman et al., 2004). This will over time reduce the desire to travel for the residents in that area, (Kåresdotter et al., 2022).

Yigitcanlar et al. (2019) states that another factor that increases the total travel time are the transfers commuters must make to connect to their next destination and this can be either while waiting for the next bus or the time taken to walk to the next transport connection. Arhin et al.

(2019) states that the acceptable waiting time for a bus range from 5 to 10 minutes and can extend to 15 minutes.

2.2.1.3 Travel effort or experience

Accessibility should also take into consideration the services provided to the public. Grengs et al. (2013) argue that mass transit should be safe and reliable. Yigitcanlar et al. (2019) states that travel experience covers several issues that are crucial to passengers, and these include level of comfort, reliability, safety, and information status.

In terms of reliability, mass transit that is less frequent is not reliable and thus restricts access to transport activities for the passengers, (Engels and Liu, 2011). This is because transport services will be limited to certain time periods thus limiting their accessibility to job related activities at those time periods, (Engels and Liu, 2011).

In terms of safety and security, social exclusion is worsened if residents within the community feel unsafe when travelling, (Currie, 2010, Currie et al., 2010, Delbosc and Currie, 2011). This could be when they are walking to the bus stop, while they are waiting for the bus and while they are in the bus. Such isolated areas tend to have high levels of robberies and attacks and have poor streetlights, isolated pedestrian walkways and high crime rates, (Kashfi et al., 2015, Kashfi et al., 2016).

In terms of information, Dziekan and Kottenhoff (2007) state that if the public transport system has poor information systems, pedestrians become isolated as it affects their ability to plan for their journeys freely. Yigitcanlar et al. (2019) is of the view that if information is provided online or on information boards within the bus stops and bus stations, which would aid the residents to plan for their trips efficiently and improve their accessibility and access to employment opportunities.

2.3 Theoretical framework

In the twenty-first century, cities have experienced rapid urbanization, which has intensified the impact of urban sprawl. Urban sprawl is defined by Johnson (2001) as the outward spread of houses, roadways, and commercial activity over agricultural territory around cities with little consideration for urban planning and public transportation. Cervero (2013) argues that sprawling cities waste resources because segregated land use development has separated land uses such as residential developments from centres of work and shopping. This ultimately results in the need for longer commuting times for commuters as they are traveling to different land uses for employment opportunities.

In general, classic locational theories argue that low-income earners should live near the CBD near jobs, whereas high-income earners would live in suburban areas, (Jordaan, 2004). For example, under the Burgess zonal or concentric model (1925), zone 3 (near the CBD) that contains manufacturing activities also contains the poor segment of the population who live in low-cost housing known as the ghetto (Burgess, 1985). Whereas, the last zones (5 and 6) consist of the high-income residents who have higher transport costs as they own cars, (Burgess, 1985,

Beauregard, 2007). The same goes with Homer Hoyt concentric theory of urban structure (1939). Low-cost residents locate near the CBD and employment opportunities and high-income residents at the suburban areas away from the noise, pollution which are characteristics of locating closer to the CBD, (Islam and Akther, 2001, Hoyt, 1954). However, Chaudhuri (2015) states that, the contrary is true in developing countries, where most low-income residents are forced to move to urban fringes to find affordable housing due to the excessive cost of living near the city centre. However, such relocation is still costly because the trade-off entails large transportation costs, which must be borne (Bertaud, 2011b, Bertaud, 2011a).

This trend leads to rapid organisation and the rise in informal settlements as seen in cities like Mexico City, Delhi, Harare, Mumbai, and Greater Cairo, (Cervero, 2000a, Cervero, 2000b, Cervero and Golub, 2007, Cervero, 2013). Studies have pointed to theories that explain some of the effects of organisation and urban sprawl because of low-income households settling at the urban fringe. The theories discussed below offer helpful background for understanding how land use and transportation are related, namely: social exclusion theory and Bid Rent theory. These theories will be discussed in greater detail below to offer helpful understanding of the impact sprawled cities has on accessibility to job prospects for residents that are at the periphery. The transport related social exclusion theory shows the impact low accessibility to different land uses can result in isolation or exclusion of those communities to important socio-economic activities of the city. Whereas the Bid Rent Curve theory shows the trade-off that is faced by households when they make location decisions. Thus, when one chooses to locate closer to the CBD, the cheaper the transportation costs but there is a trade-off of high rentals, and the opposite is true. Therefore, every decision made has an opportunity cost attached to it.

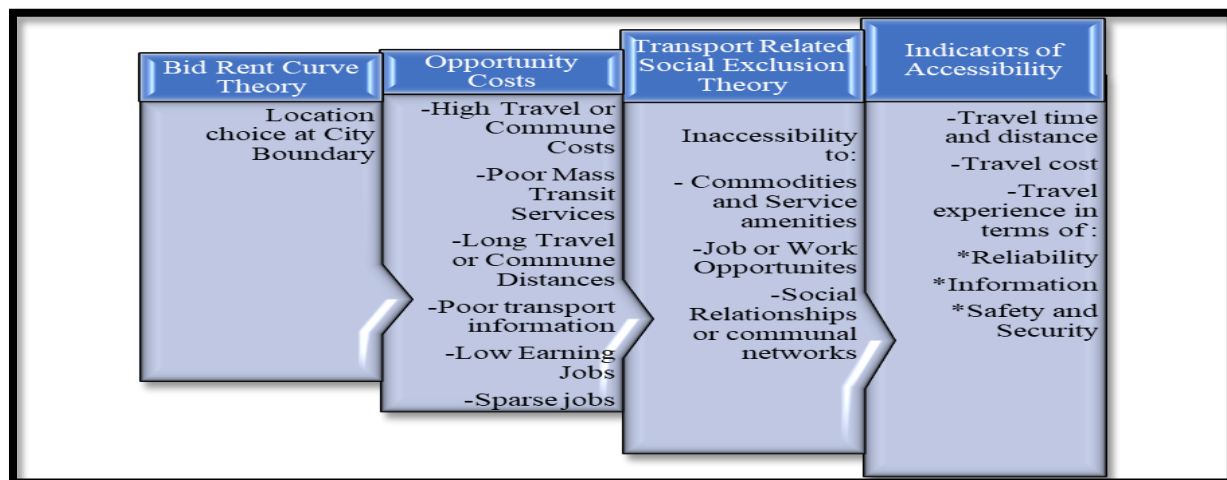


Figure 1: Framework demonstrating the connection between the theories and accessibility measures.

Source: The researcher's own creation

Figure 1 shows that the location choice or decision to location at the urban periphery for the low-income residents' results in opportunity costs that they may or may not have foreseen. These include high transport costs, poor public transport services, long travel distances, poor transport information, access to low-income jobs and having limited jobs. Due to these opportunity costs the peripheral settlements face transport related social exclusion as they face inaccessibility to goods and services, social capital, jobs, and social networks.

2.3.1 The Bid Rent Curve Theory

The theory helps in elaborating the research problem with regard to the influence of accessibility and transport costs on residential locations. It provides an explanation of the transportation and land-use trade-off. Chidi (2019) defines the Bid Rent theory as "the maximum amount of money that households are willing to offer for a unit of land given its level of available services." Viruly (2015) and Alonso (1964), state that the theory hinges on the premise that, when all other factors are held unchanged, transportation costs increase the further one travels from the CBD, which is the ideal location. According to this notion, the CBD is the most accessible region because all transportation systems converge in the CBD (Jordaan, 2004). Furthermore it has, the highest level of activity, including elevated levels of employment and social services, as well as the highest rental rates (Jordaan, 2004, Mayhew, 2006). As one moves farther from the CBD, the area becomes less appealing to commercial enterprises because such areas become less accessible, resulting in lower property values or rental rates, allowing for the development of residential and industrial land uses (McDonald, 2006, Charles and Kerry, 2005, Trussell, 2010).

The bid rent curve suggests that the trade-off between transport and rental values should leave the resident in an equal welfare position known as the utility maximizing location. According to Giuliano (1989), this is the point at which the marginal cost savings of housing is equivalent to the marginal cost of transportation. Scholars contend that the theory's underlying assumptions—that each household has a single worker, that only work-related travel is taken into account, and that the cost of unit transportation is constant and uniform in all directions—make it nearly difficult to achieve this position. In real-world circumstances, these presumptions are rarely true, making it hard to find an ideal location (Giuliano, 1989).

Therefore, households who choose to live in the CBD will have lower transportation costs but higher housing expenditures, (Gordon et al., 1989, Litman, 2013, Acheampong and Anokye, 2013, Glaeser et al., 2008, Zhao et al., 2010). Thus, any savings made by residing on the outskirts of a city where housing costs are lower are offset by the higher transportation expenses that arise, (Litman, 2013, Giuliano, 1989, Wegener, 2004).

The growth or development of public transportation has a significant impact on accessibility as well as the form of the bid rent curve, (Narvaez et al., 2013, Bochnovic, 2014, Basso et al., 2021). The arrival of public transportation, such as the BRT, may flatten the bid rent curve, (Viruly, 2015). Therefore, due to improved accessibility of peripheral areas, this results in the creation of sub-

centres from the CBD known as "polycentric cities" as they become more desirable (Lombard et al., 2017, Debrezion et al., 2007).

2.3.1.1 Contextualising the Bid Rent Theory to the Study Location

Implications of the Bid rent curve towards the study is based on the choice that residents of Witsand make in locating in Witsand. The implication of their choice is that their housing costs will be lower but at the expense of incurring higher transportation costs as they face higher commuting costs as Witsand is a peripheral settlement of Cape Town. Viruly (2015) argues that adding a BRT will flatten the bid rent curve which has an impact of improving accessibility in the peripheral areas. Thus, this study seeks to assess if the MyCiTi BRT system has improved access to employment opportunities in Witsand.

2.3.2 Transport-Related Social Exclusion Theory

Several academics have linked accessibility to social exclusion, arguing that poor levels of accessibility lead to a certain group of residents being excluded from social and economic opportunities, (Kenyon et al., 2002, Kenyon, 2003, Titheridge et al., 2014, Hernandez and Titheridge, 2016, Preston and Rajé, 2007, Combs, 2017, Currie and Delbosc, 2010, Delbosc and Currie, 2011, Venter and Cross, 2014). Martens and Di Ciommo (2017), for example state that "inaccessibility is a key component of social exclusion" as good transportation, lies in improved accessibility to the community. That is, the welfare of the society is improved with good transportation as they are now more connected and included and can participate in different activities of the community (Geurs and Van Wee, 2004, Cervero et al., 2006).

Transportation-associated social exclusion is when a society is excluded from wholly participating in the socio-economic opportunities available to them such as the social networks, services and opportunities due to "insufficient mobility options in the society and having an environment built around the assumption of high mobility," (Kenyon, 2006, Titheridge et al., 2014, Church et al., 2000). Whereas, Levitas et al. (2007) describe social exclusion as a situation in which the residents of a community are "denied resources, and rights to engage in the usual interactions and activities, available to most people in the society, ". Both personal well-being and livelihood and societal equality and unity are affected. While, Church et al. (2000) view social exclusion as households who are underprivileged and are no longer able to connect to several employment opportunities or take part of the society wholly, thus affecting their welfare. The implication of this definition is that households that cannot fully engage in their community face reduced social capital and resources and are vulnerable to becoming and remaining poor, (DfID, 2005). Hanmer et al. (2000) and DfID (2005) argues that being excluded from services and markets makes the residents poor in terms of income and education.

Stanley and Lucas (2008) states that the London School of Economics (LSE) identified several variables that determine the group of people affected by social exclusion, and these are identified by savings, consumption, social activity, production, and administration. They argue that in terms

of savings, those who are socially excluded are impeded from saving towards owning their own property. This factor is linked to the second factor on consumption in which social exclusion influences one's ability to consume basic products and services that should be available to everyone in society, (Stanley and Lucas, 2008). Linking this to the study, because transportation consumes a significant percentage of one's salary, it affects their ability to consume other goods and services. For example, it affects their ability to take their kids to better schools in addition, because most of their income is channelled towards housing and transportation, their ability to save is greatly impeded thus reducing their ability to save towards owning property.

In terms of administration, social exclusion impacts one's ability to participate in collaborative attempts to better the larger social and physical environment, such as voting and campaigning administration, (Stanley and Lucas, 2008). This is because social excluded people spend a lot of their time travelling, thus reducing the time they could be productive or engage in administrative purposes. This is linked to the production and social activity factors whereby social exclusion impacts one's ability to participate in production services such as education, employment, and training, as well as their ability to interact socially with others (social activity) (Stanley and Lucas, 2008, Burchardt and Huerta, 2009). Long travel distances mean more time lost travelling thus reducing ability of such people to interact with others and being more productive.

“Social exclusion or marginalisation” was introduced by Church et al. (2000) as comprising a loss of essential services in society as a contributing factor. Hanmer et al. (2000) states that poverty is a multi-faceted issue that encompasses difficulties such as a lack of assets, low income, and consumption, as well as reduced social involvement, diminished capabilities, diminished security, and limited free time. One may therefore, argue that transport related social exclusion is linked to poverty in that it limits people's capacity to access services and occupations that would allow them to fully integrate into society (Hanmer et al., 2000). Thus, they are cut off from decent job opportunities and growth opportunities.

Bassolas et al. (2019) argues that cities are extremely reliant on mobility, and many cities have sprawling features, making the impact of transportation deprivation important to asset accumulation. Church et al. (2000) made the point that was later buttressed by Hammer (2013) that social exclusion is a reinforcing process that causes poor people to become even poorer by reducing their odds of stopping the downward trajectory "of diminishing abilities to participate in mainstream" society, such as social capital, political capital, and cultural capital. This results in the informal sector thriving in the area. Moreno-Monroy (2016) states that transport related social exclusion reduces employment in the formal sector as the physical constraint to employment results in elevated levels of unemployment. He further argues that because of the long distances to travel to areas of employment most workers would rather work locally were the informal market is more prevalent, (Moreno-Monroy, 2016).

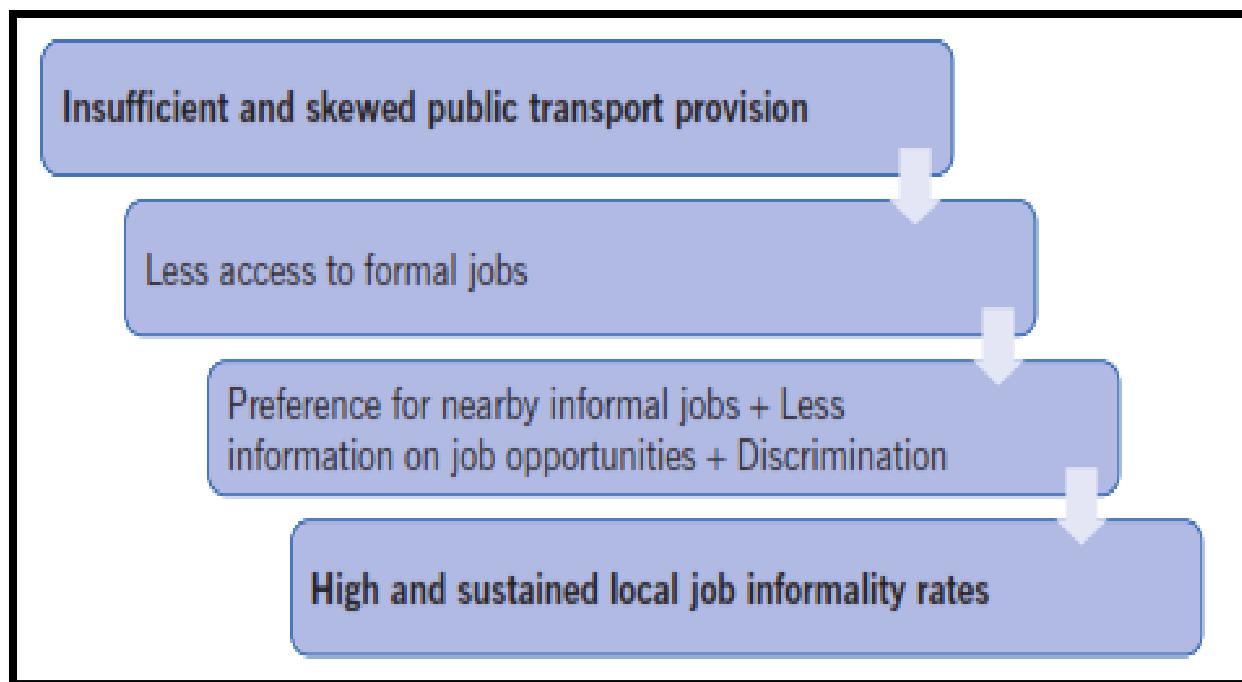


Figure 2: how poor transport can lead to informal sector.

Source: (Moreno-Monroy, 2016)

Figure 2 shows that areas with poor transportation services (poor transport accessibility) tend to have low levels of accessibility and this leads to reduced access to employment opportunities in the formal sector. This is because the long distances dissuade one from seeking formal employment. Secondly the workers have less information on job opportunities in central locations and those that apply face discrimination from employees. Moreno-Monroy (2016) argues that this is because most employers are afraid that long distance travel will impact the productivity of the workers and secondly because they do not want to compensate for travel costs of the employees.

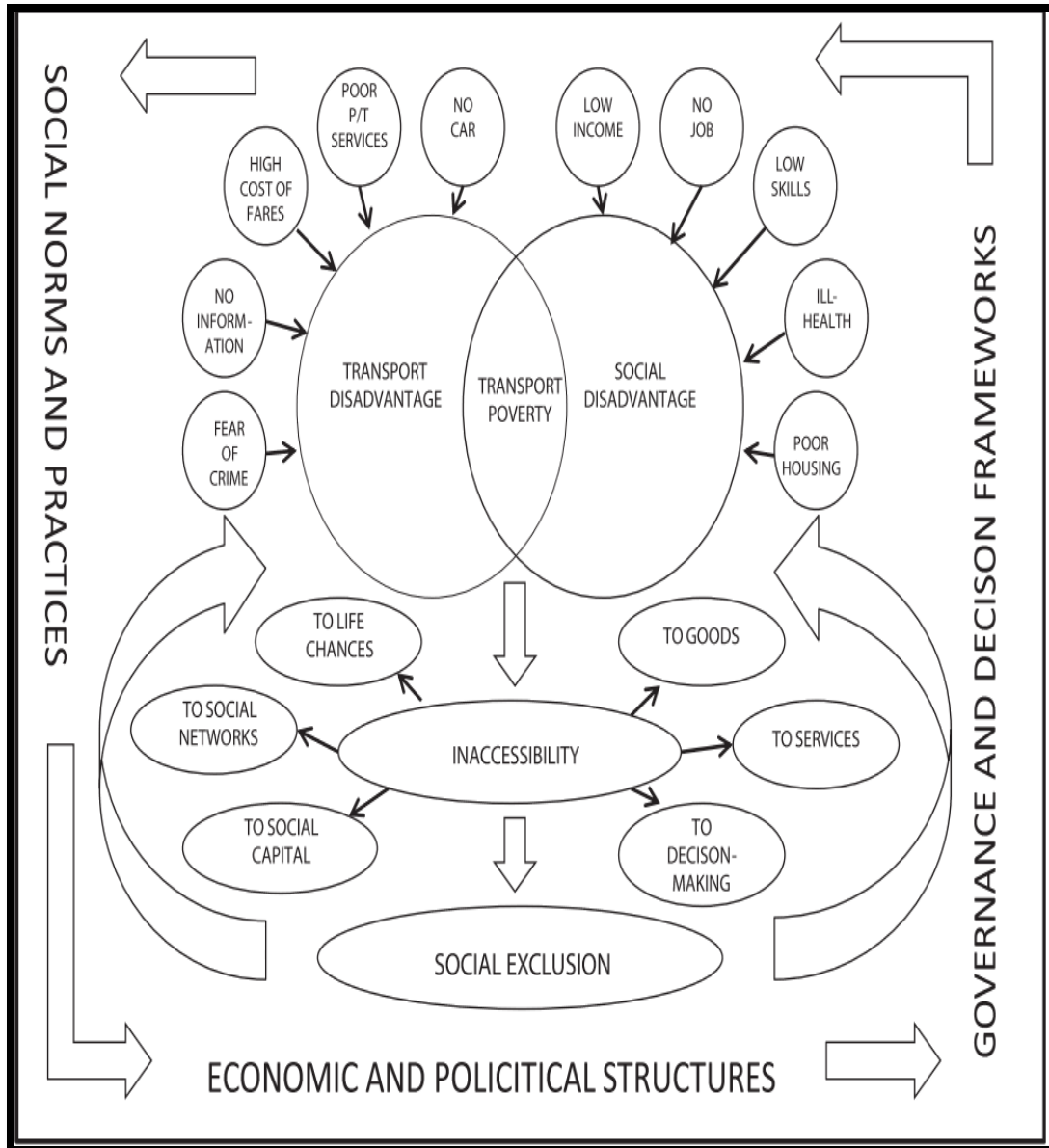


Figure 3: Relationship between transportation disadvantage and social exclusion

Source: (Lucas, 2010a)

Figure 3 shows the link between transportation inequity and social exclusion. It shows that a shortage of transportation can lead to unhealthy isolation, which has a negative impact on people's living standards, (Currie and Delbosc, 2010, Delbosc and Currie, 2011). Poverty is a multidimensional problem that is caused by many different facets but for this research social exclusion is caused by transportation poverty, which is exacerbated by several factors such as high fares, low income, lack of a car or job, lack of information, and bad housing. People are isolated or unable to access critical economic and political structures, like products, services, social capital, and decision-making chances, because of these causes. As a result, they will be exposed to low-

paying occupations, resulting in low income, no car, bad housing, and high transportation expenditures, creating a vicious cycle of transportation poverty. Being isolated diminishes a person's job search area and, their information network, resulting in elevated levels of unemployment or low-wage employment, thus limiting their upward mobility, (Musterd and Ostendorf, 2005, Kasinitz and Rosenberg, 1996, Hu, 2017, Cervero, 2000a, Cervero, 2000b, Cervero et al., 2002).

2.3.2.1 Factors affecting Transport-Related Social Exclusion

Transportation-related social exclusion comes in diverse ways geographic (distance), time, economic (cost), physical, or space-base, (Church et al., 2000). These factors are also the indicators that measure accessibility. As such transport related social exclusion theory has elements of accessibility. This is because accessibility can result in a settlement to being either excluded or include within the socio-economic activities of the city, (Kenyon et al., 2002, Kenyon, 2003, Currie and Delbosc, 2010, Titheridge et al., 2014, Combs, 2017, Venter and Cross, 2014).

2.3.2.1.1 Geographical exclusion (Travel distance)

Geographical exclusion occurs when people must travel long distances due to sprawled cities that have grown outwards. This is prevalent in urban areas as inexpensive housing is typically located in areas with inadequate transportation connectivity, limiting their access to work prospects, (Titheridge et al., 2014, Andreasen and Møller-Jensen, 2017). Lucas (2010a) and Ureta (2008) argue that the residents must also travel longer distances to central employment areas, as they have insufficient or poor transportation systems. According to the Department of Transport (2007) more than 75% of South African homes, both rural and urban, lack access to a train station, which is the cheapest means of travel. The areas either have no existent train or one operating in the area is in poor condition and offers poor service. Thus, the residents are forced to use alternative methods of travel like minibus taxis that charge higher fares and as such increase their transport costs that adds to their social exclusion.

2.3.2.1.2 Economic exclusion (Travel Cost)

Economic exclusion occurs due to affordability difficulties that is high transport costs exerted on the residents, thus affecting their ability to pay for the costs. Most households are not able to engage in socioeconomic interests because travel costs exceed what their income permits them to spend, preventing them from using public transportation (Cervero, 2013, Adeel et al., 2016). They are limited to low-paying jobs in their communities, working as domestic workers and gardeners that do not fit their skill set, (Green, 1995). In addition, Guerra and Kirschen (2016) states that households spend a large part of their income on transportation, which is unsustainable. In 1986 Armstrong Wright came up with the concept that households should not spend more than 15% of their income on transportation as such a transportation will unfair and discriminatory to them (Falavigna and Hernandez, 2016, Cervero et al., 2002, Cervero, 2013, Litman, 2013, Department of Transport, 2007, Cervero, 2011).

Falavigna and Hernandez (2016) argues that in Latin American cities, the poorer low-income groups must increase their trip costs by more than 30% to obtain the same levels of mobility and accessibility as the middle-income group. Cervero (2011) states that, in Mexico City, the transports costs per month, were more than 25%; in Nairobi and Mombasa, the cost was between 20% and 30%; in Delhi and Manila, the cost was between 20% and 25%; and in Dar es Salaam, the cost was between 20% and 30%. According to Kumar (2011) expenses are greater in developing countries because low-income housing is built in outlying areas, and roughly 80% of public transportation is provided by informal operators who are weakly controlled and hence demand higher prices than the regulated bus systems.

2.3.2.1.3 Time exclusion (Travel time)

Transport-related social exclusion can come in terms of time. In that, families spend a significant amount of time traveling to and from places of jobs, which prevents them from participating in other important activities (Lucas, 2010b, Lucas, 2010a). Church et al. (2000) states that their ability to organize commitments (time allocation) is greatly limited by the transportation network. For example, certain people after work, particularly women, are occupied with domestic activities such that they no longer have time to travel for other activities unless it is a weekend (Adeel et al., 2016, Alberts et al., 2016).

2.3.2.1.4 Space exclusion (Safety and Security)

Exclusion can also come in the form of space. That is, the way the public transportation space has been constructed, monitored, and maintained, can discourage people from using it, by creating a sense of ownership or dread among transportation users (Church et al., 2000). Smith in 1997, states that women would travel more if the space was constructed with enhanced features for surveillance to improve safety and in-cooperated structures for child support and support structures, (Smith, 1997).

2.3.2.1.5 Physical exclusion (Travel experience)

Lastly, exclusion can come in the form of physical exclusion. Gaffron et al. (2001) states that, the physical arrangement of the transportation system and its infrastructure can be difficult to comprehend, preventing people from using it. An example of such a physical exclusion includes children, the elderly, and persons with disabilities such as hearing and vision problems (Hernandez and Titheridge, 2016, Casas and Delmelle, 2014, Social Exclusion Unit, 2003).

2.3.2.2 Contextualising the Transport-Related Social Exclusion Theory to the Study

Location

Witsand is a peripheral settlement located 40km from Cape Town city centre. Prior the development of MyCiTi BRT, the area experienced transport related social exclusion. Thus, the residents of Witsand were excluded from socio-economic activities and opportunities of the city.

Examples include exclusion from social networks and interaction, education, employment, training, and health facilities.

The community faced space exclusion in that, the area had no direct public transport services linking them to the city centre. There was no train services and the residents depended on minibus taxis that connected them to Dunoon and from there interconnect to different areas of employment. As such they also suffered from economic exclusion because they had to pay higher fares as minibus fares charge higher costs than conventional buses. The area because of its geographical location, meant that the residents had long commuting distances to and from work and faced time-based exclusion where they spend significant amounts of their time traveling. Because of the transport based social exclusion, most work opportunities available to the residents were informal jobs found locally.

The transport related social exclusion theory is linked to the bid rent curve theory through transport costs. The latter argues that for every location choice one makes, there is an opportunity cost incurred in terms of a trade-off. For example, the urban poor located on the periphery incur lower housing costs however face higher transportation costs. It is these high transport costs that will result social exclusion. Thus, the former states that the high transport costs that are paid by the residents to access different land-uses increases their exclusion.

2.4 Overview of Bus Rapid Transit (BRT)

Settlements located at the periphery suffer from social exclusion as noted from the theories above and thus the BRT comes as a solution to solve the accessibility problems in Witsand. The Bid Rent Curve Theory showed that residents at the periphery of the city face high commuting costs, thus the BRT also comes as a cheaper mode of travel for the residents of Witsand. Lucas (2011) and Blumenberg (2004) state that one of the difficulties facing urban planners is providing transportation that connects low-income communities on the outskirts of cities to employment possibilities, which are largely concentrated in the city centre. Investments in BRT networks have been undertaken as a response to help with this.

BRT is defined as "an efficient, high-quality mass transportation mode that provides capacity and speed when compared to light and heavy rail systems" (Institute, 2012). Levinson et al. (2003) defines it as an integrated bus transit system with services, facilities, and amenities aimed at enhancing public transportation reliability and speed. Cervero (2013) states that the system has dedicated bus lanes, bus stops, consistent route operations, and a pre-payment fare system that improves the system's efficiency. It is thought to provide outstanding services in terms of safety, efficiency, reliability, flexibility, speed, and affordability (Cervero, 2013, Wright and Hook, 2007, Vaz and Venter, 2012). However, according to Vanclay (2012) the system's performance is largely determined by how it connects with other modes of transportation on the road and how it is structured to satisfy the needs of the local area in which it is implemented.

The main motivation for most developing countries to implement the system, is to move away from informal public transportation systems, which are mostly unregulated and impose a higher cost burden on the people (Hidalgo and Huizenga, 2013, Kumar et al., 2012). The BRT is more pro-poor because it improves accessibility at a low cost according to (Wood, 2015, Jones, 2011, Marcus et al., 2013, Jennings, 2015).

2.4.1 MyCiTi BRT system

In 2010, the Bus Rapid Transit MyCiTi was pioneered in Cape Town. It was planned and built to provide access to social and economic services like health, jobs, and recreation for Cape Town's low-income neighbourhoods (Transport for Cape Town, 2012). Another goal of delivering MyCiTi to low-income households was to lower the high percentage of their income spent on public transportation, which in most cities in South Africa is around 40% instead of the suggested 10% (Transport for Cape Town, 2012, Transport for Cape Town, 2015c).

Prior to the development of MyCiTi, most residential areas in Cape Town were served by golden arrow buses, minibus taxis and the train that served selected areas. The minibus taxis were the primary mode of transportation, which severely limited the options for the residents, particularly for those who could not afford the services because the mode of transportation is regulated by market forces, which set higher prices. The City of Cape Town Municipality consequently planned that the Blaauwberg corridor would be the project's initial phase of implementation. The corridor connects regions on the West Coast such as Atlantis, Dunoon, Melkbosstrand, and Table View to the CBD, according to (Transport for Cape Town, 2012, City of Cape Town, 2013). One of the corridor's main goals was to attract residents who were previously unable to travel due to high transportation costs (known as low mobility/captive users) as well as private car users who wanted to switch to the BRT due to improved public transportation efficiency (known as choice users) (Allansson and Kajander, 2017, Martens, 2006, Martens and Di Ciommo, 2017).

It was built in stages, the first phase was designed to alleviate traffic congestion, particularly during peak hours in the morning and evening. It supplied transportation to low-income towns such as Mamre (74,5km), Atlantis (74.2km), and Dunoon (74.2km) that are located distant from the CBD (31.8km). The figure 4 shows the routes of Phase A after it was completed. It includes routes such as: Atlantis to Cape Town, Du Noon to Cape Town civic centre, Atlantis to Melkbosstrand to Table view or Bayside to Montague gardens, (Transport for Cape Town, 2012).

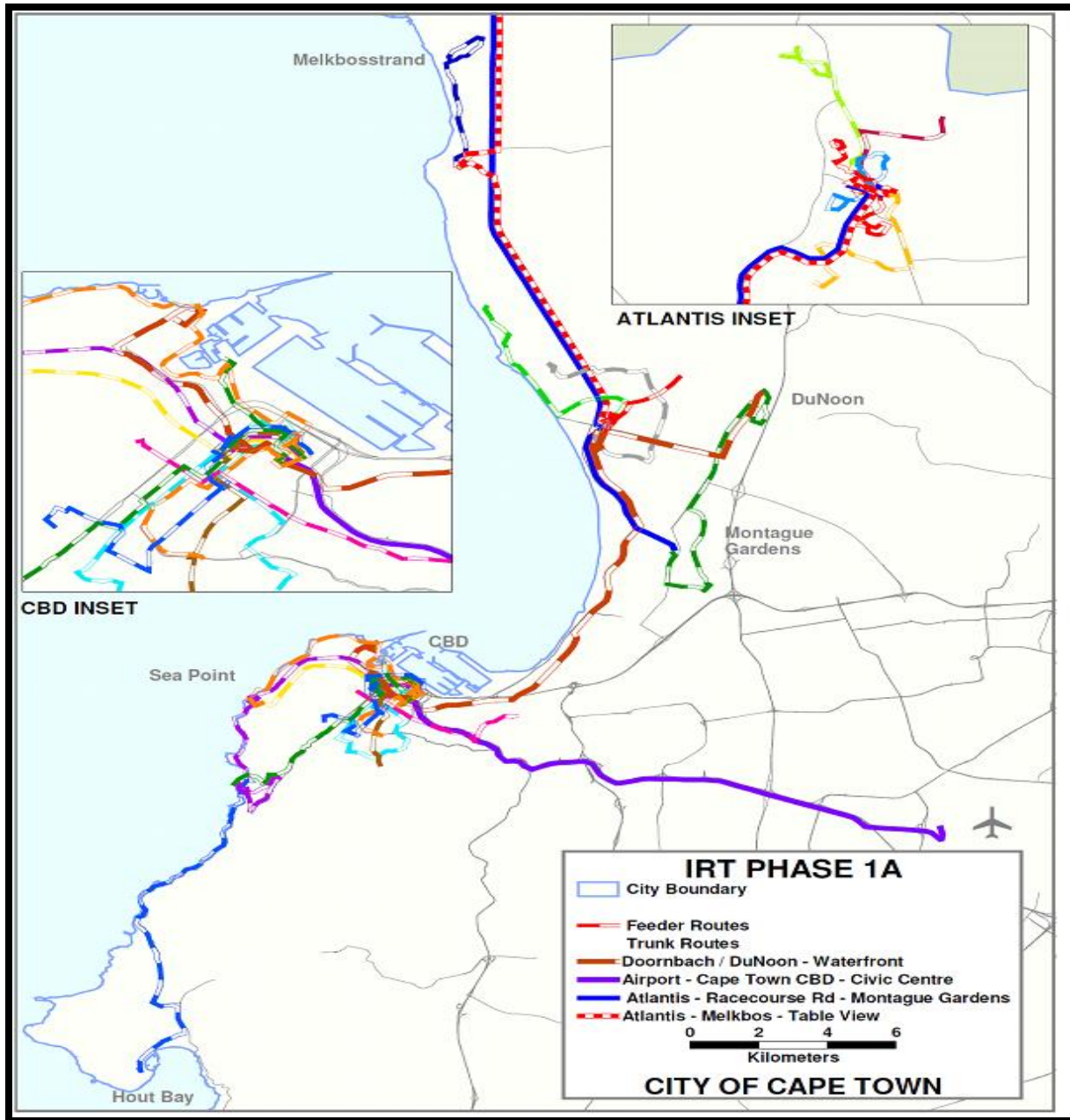


Figure 4: MyCiTi Phase A.

Source: (Transport for Cape Town, 2012)

2.4.1.1 Benefits of MyCiTi.

Eichhorn (2015) states that, MyCiTi has enhanced inhabitants' access to work prospects by connecting three nodes of economic potential: Atlantis, the CBD, and Epping and Paarden via the BRT. As a result, the number of job opportunities available to citizens has expanded. In addition, City of Cape Town (2016) states that "the cost of looking for work in Cape Town is lower than in

other South African cities because of the integrated public transportation infrastructure, particularly MyCiTi, which is working efficiently to create an environment that allows those who are unemployed to sustainably search for active jobs". Cape Town has more than fifty different business nodes that serve as job prospects, including commercial and industrial districts (City of Cape Town, 2016, Transport Development Authority, 2016). It is worth noting that there are minor nodes in and around Cape Town that do well in serving as employment hubs for places outside of the CBD such Century City, Brackenfell, Tygervalley, Claremont, and Blackheath. Century city, for example, has seen a 245 percent rise in commercial building stock, while Tygervalley has had an 80 percent increase (City of Cape Town, 2016). Killarney Gardens, Brackenfell, and Blackheath are examples of notable industrial growth providing employment prospects on the outskirts.

The importance of constructing a BRT, to Department of Transport (2007), was reduce traffic congestion by encouraging more people to use mass transit instead of individual cars. Reduced congestion levels are important for accessibility because they contribute to faster travel speeds, which means less time spent traveling and more time spent on economic and social activities. The BRT operates on dedicated lanes, which eliminates time wasted while sharing the same lane with other modes of transportation, thus lowering journey time for MyCiTi passengers (Transport for Cape Town, 2012).

2.4.1.2 Challenges faced after the development of MyCiTi.

However, the benefits of reduced travel time and congestion due to the development of MyCiTi's dedicated lanes are negligible because the city's spatial organization makes it difficult to reap the benefits. Allansson and Kajander (2017) argue that most people of low-income communities on the outskirts of cities, such as Witsand, must spend more than 1 hour 30 minutes to 2 hours merely to get to their places of employment, resulting in a total commute time of 4 hours. They will spend much of the year traveling, so as the year concludes, they have less of their time to engage wholly in the city's socio- economic interests. The time wasted while changing buses or waiting for them, adds to the overall travel time for public transportation. Allansson and Kajander (2017) go on to say that the BRT system's planning is inconsistent in some areas, lowering its efficiency in terms of cutting travel time. They state that some elements of the system do not run-in dedicated lanes since buses share the road with other means of transportation, (Allansson and Kajander, 2017). As a result of the buses being stuck in traffic on the route, travel time increases. Another challenge of the spatial organisation of Cape Town is that employment densities are low in low-income areas and higher in high-income ones, (City of Cape Town, 2016) .The hub or hotspot for most economic activities in Cape Town is located within the CBD or civic centre of the city and to the south of the city. It is worth noting that commercial hubs with more job opportunities prefer to locate in regions with better accessibility, amenity, and safety than affordable land where low-income inhabitants live (City of Cape Town, 2016). As a result, businesses regard those regions to be impoverished and unsafe, making it difficult for the city to establish employment possibilities in those areas.

2.4.2 BRT Accessibility Impacts and Knowledge Gap.

Venter et al. (2018) states that BRT enhances accessibility by reducing system speeds, which correlates to shorter travel times and hence increase access to varied land use activities. However, to Ferbrache (2019) the degree of improvement in accessibility for those living on the outskirts of cities is still unclear. Accessibility studies do not provide a clear picture of how many possibilities, such as jobs, the system can reach (Combs, 2017, Scholl et al., 2016, Scholl et al., 2019). Jones and Lucas (2012) go on to say that most of the rise is potential not realised because the real level of opportunities available on the ground has not improved. Jaramillo et al. (2012) states that the study of the poor's mobility needs in Colombia, the BRT has no substantial influence on reducing social exclusion.

According to a 2014 study by the Department of Transportation of South Africa, one of the most crucial factors influencing low-income households' mobility is transportation affordability, which causes many to turn to non-motorized transportation as an option because public transportation expenses are too expensive for them (Lionjanga and Venter, 2018). Salon and Gulyani (2010) argues that a BRT would boost access to job and educational possibilities, allowing people to break free from poverty and injustice.

The Transmilenio, for example, was a BRT designed for Bogota, Colombia's capital city. Hidalgo and Yepes (2005) states that the system was created to improve accessibility for the city's underprivileged to various places. Delmelle and Casas (2012) state that the system improved connectivity between periphery villages and the inner city, resulting in a 32 percent reduction in travel time. Morales (2010) on the other hand, argues that, despite the system's stated goal of serving the poor, it has failed to reach its intended audience since the charges are too high for them, making it more accessible to the middle- and upper-income groups. Carriazo and Mogollón (2015) state that the Transmilenio's pricing climbed by 100 percent between 2000 and 2010, compared to 74 percent for traditional buses, causing 75 percent of the urban poor to switch from BRT to traditional buses because they are more inexpensive.

2.5 Case study area: Witsand, Atlantis

The study was conducted in Witsand, an informal settlement in Atlantis (figure 5), located about 40km from the CBD, (Magida, 2013). GreenCape (2020) states that the settlement has a population of 4689 people, who are mostly African descendant specifically speaking isiXhosa, English, and Afrikaans.

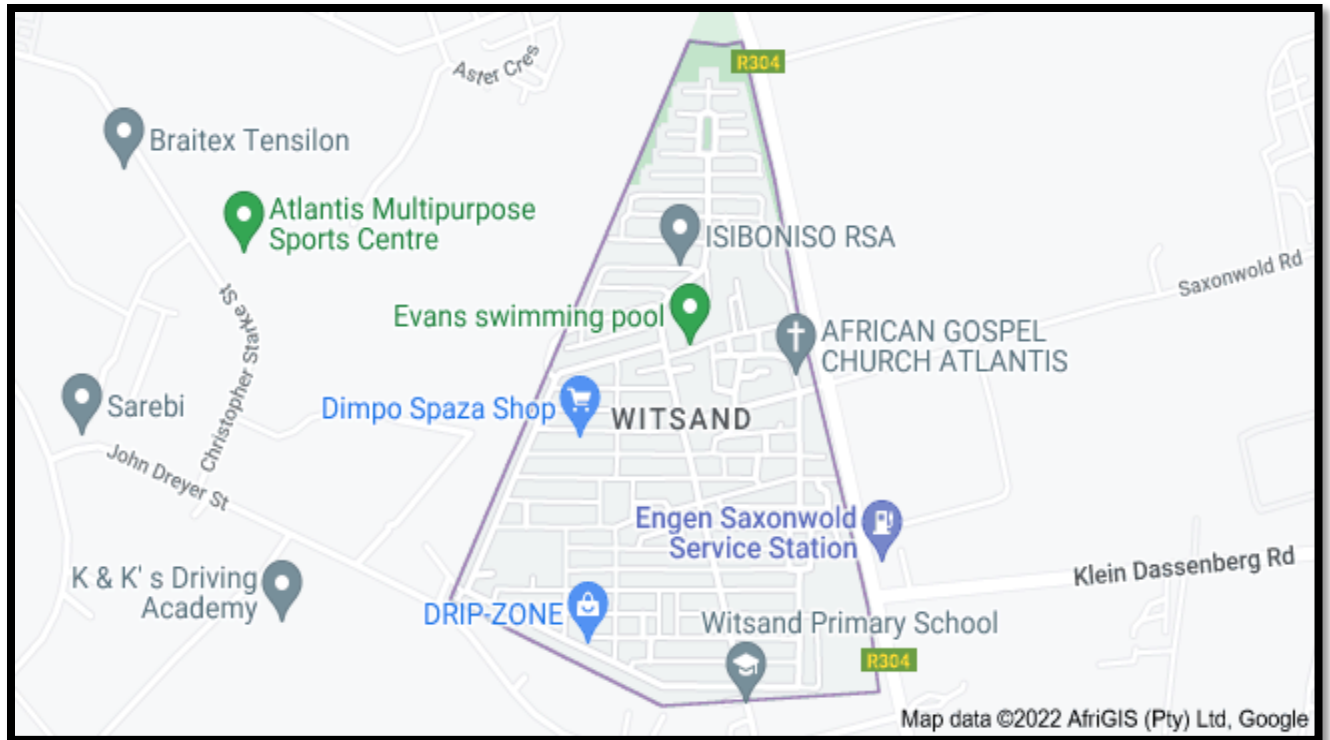


Figure 5: Map of Witsand

Source: Google Maps, 2022: <https://goo.gl/maps/k6j2JkjRrQPtfw46>

The settlement came into existence in the 1990s on privately owned land that was uncultivated, (Stafford, 2005). The people occupied the land due to some of the people who had lost their jobs within surrounding farms, which forced them to locate within the area (Magida, 2013). In addition, there was immigration of people from Eastern Cape in search of employment thus creating squats in the area, see appendix 3 (Stafford, 2005). GreenCape (2020) state that the people also migrated to Witsand to have affordable rent and move closer to their families that had migrated earlier with most having been moved between 2014 and 2018. This resulted in the gradual growth of the settlement over the years.

2.5.1 Selection of Witsand as the Research`s Case study

Witsand is one of the disadvantaged communities in Cape Town and falls under the low-income residents, (City of Cape Town, 2020). From the bid rent curve theory perspective, Witsand is a low-income residential settlement located at the periphery of Cape Town and as such face's opportunity costs of high transport costs and long travel distances.

The government developed housing for the residents known as Reconstruction and Development Programme houses. The residents also constructed their own housing made from iron or wood called shacks. The area faces elevated levels of social inequality, (GreenCape, 2020). A study undertaken by Strydom (2010) identified several settlements in Cape Town, which face elevated

levels of social inequality and these included Witsand (the study area), Dunoon, Khayelitsha, Nyanga, Imizamo Yethu and Masiphumelele. These areas are mostly occupied by African and coloureds who live in informal settlements.

According to research conducted by CoCT in 2014, most Whites and Asians (52, 7%) in the city travel shorter distances to their places of employment (about 15 minutes) than blacks and coloureds (27, 3%), (CoCT, 2016). Like Witsand and other low-income residents, most blacks and coloreds travel more than 60 to 90 minutes, and others travel more than 90 minutes, to reach employment places (City of Cape Town, 2016). As a result, the city has a high level of social disparity.

Church et al. (2000) and Allansson and Kajander (2017) argue that residents are effectively excluded from socio-economic activities because they must spend so much time traveling to and from work. According to the National Household Travel Survey for Cape Town in 2013, the urban poor spent more than 29 percent of their time traveling than those with higher income, forcing part of the poor residents to avoid traveling, (Aivinhenyo and Zuidgeest, 2019).

Witsand was selected for the study because of its location at the periphery. Prior the development of MyCiTi, the area had an accessibility problem in line with the theories provided. Thus, the residents faced exclusion to socio-economic activities and paid high transport costs as they did not have an efficient public transport system in place. The area had no train facilities that passed through the area and had to rely on minibus taxis that charge higher fares than those of a public bus transportation system. As such the area faced connectivity and access problems to the city.

Rayle (2017) states that because social marginalization is an all-time high phenomenon, in Cape Town's geological landscape, therefore, creating a successful BRT was essential. Thus, because Witsand faced social marginalisation and transport related social exclusion, creating a BRT in the area was needed to improve accessibility to employment, health, social and economic activities. For the residents.

2.5.2 Public Transport in Witsand

In terms of public transport, Witsand has no direct access to rail. Minibus taxis provided travel services to both local services and outside Atlantis such as to the CBD, Atlantis Centre, and Dunoon. City of Cape Town (2015) argues that minibus taxis charge higher fares than the public transport modes in the area. However, it operates on a more flexible timetable - collecting and dropping the residents at their doorsteps.

The second mode of transport used in Witsand is Golden Arrow buses also known as Sibanye (meaning we are one) bus services that was founded in 1994. The buses provided (and still do) scheduled timetable services but tend to be more costly when compared to MyCiTi service, (City of Cape Town, 2015). Sibanye buses pass through the community of Witsand by the main road R304 road at Engen Saxonwold service station as they travel towards Atlantis and Mamre. The buses have faced a lot of service challenges in the area from minibus taxi drivers that demanded their discontinuance of their services due to their low patronage.

MyCiTi BRT system started to operate in Atlantis on the 12th of April 2014 with six routes and sixty-five stops and were further rolled out in 2016 with three more feeder routes and a direct trunk route from Atlantis to Cape Town CBD (City of Cape Town, 2015). Like Sibanye, MyCiTi services did not operate within the settlement, due to resistance by minibus taxi drivers. Thus, the residents' access MyCiTi services by walking to the MyCiTi bus stops that are located at the industrial sites. As a result, residents either walk to the MyCiTi bus stops or they take minibus taxis to Atlantis station. Appendix 8 shows the direct MyCiTi routes that operate from Atlantis. The routes link to Cape Town civic centre and Table View to link them to the rest of the MyCiTi system that takes them to different areas.

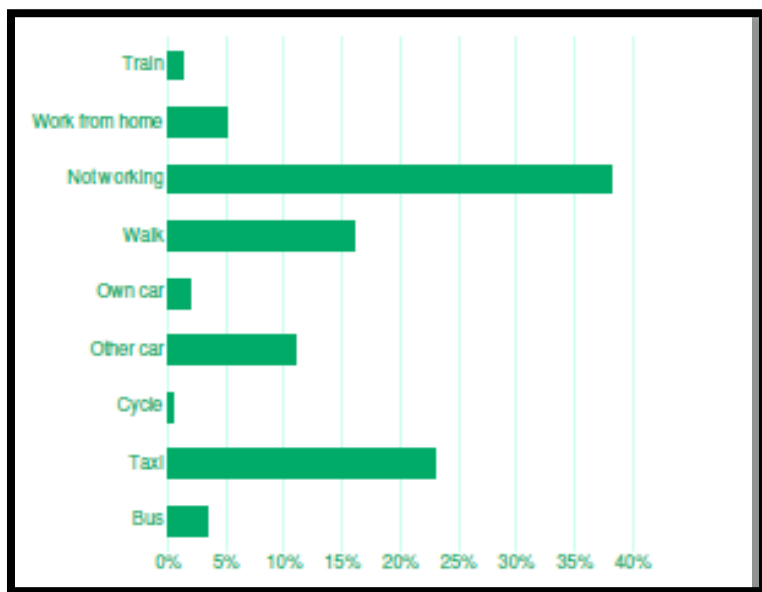


Figure 6: Public Transport in Witsand

Source: (GreenCape, 2020)

Figure 6 shows the main mode of transport used in Witsand prior to the development of MyCiTi BRT, (GreenCape, 2020). It demonstrates that 38% of the residents were jobless and thus would rarely use the public transport system. While 23% would use minibus taxis, thus showing that the minibus taxis were their main mode of travel. Whilst 16% of the residents would walk normally to local industries or in local informal market for employment and 5% opted to work from home.

2.6 Policy and Legislative framework

This section looks at the policy and legislative framework that governs accessibility issues and land use and transport planning. It covers the accessibility challenges in Cape Town such as the spatial structure that encourages longer commuting and inheriting an unequal city from apartheid. The section also covered the policy strategies done by the municipality as well as look at how the policies have been implemented on the ground and its impact on low-income settlements.

2.6.1 Accessibility Challenges in Cape Town

2.6.1.1 Spatial structure

Based on Transport Development Authority (2016), Cape Town has an unequal spatial city structure that has segregated low-income citizens from job centres by requiring them to travel great distances. Turok (2001) argues that the spatial organization encourages "low densities in their land use planning", making it much harder to develop an effective and viable public transportation system. Combining land use and transportation is critical for boosting accessibility to diverse activities related to the economy, as well as promoting land use growth near people's homes (Dur and Yigitcanlar, 2015, Te Brömmelstroet and Bertolini, 2010).

2.6.1.2 Transport Road design

Another problem posed by the city's physical organization is that transportation routes are radial in design, meaning that all routes are connected to a single centralised point, which is, they begin and stop at the CBD or civic centre (Allansson and Kajander, 2017, McLeod et al., 2017). The disadvantages of such a structure include that most economic activities are concentrated in the CBD, and consequently, people are obliged to travel larger distances to reach various destinations because they are required to pass through the CBD to get to different areas when using public transportation (Allansson and Kajander, 2017, Zhao and Li, 2016). As a result, as they interact to get at various places of social and economic activity, travellers must pay more. Even though MyCiTi has improved access to the CBD, the system still does not operate in many sections of the city, forcing those who cannot afford to pay for Mini-bus tax services to be excluded from job prospects in such locations since they charge higher costs.

2.6.1.3 Congestion

Cape Town is the most crowded city in South Africa, with a congestion rating of 23% in 2020, (TomTom, 2021). City of Cape Town (2016) states that city drivers are compelled to spend an additional 40 minutes on the road due to traffic congestion. Allansson and Kajander (2017) argue that one of the goals of the Blaauberg corridor was to alleviate the city's elevated levels of traffic congestion. The biggest problem that the city faces is converting the city from the inequal and inequity city that was inherited from apartheid to an integrated compact spatial form city, City of Cape Town (2016). The purpose of combining urban settlement planning and transportation planning is to construct compact communities to reduce transportation costs and travel time for people. (City of Cape Town, 2017a, City of Cape Town, 2017b)

2.6.1.4 Transport Costs

One principal factor of accessibility are transport costs that impacts affordability on the part of the residents. In an interview with a Development and Aid journal, Councillor Brett Herron, commented that the MyCiTi system, with its corridors and buses, is not enough to deliver the

amount of change required to offer significant economic benefits to low-income areas, noted in appendix 7. Jennings (2015) states that while low-income citizens may benefit from more accessible and rapid BRT services, the services of MyCiTi may disadvantage them by being expensive and out of reach, preventing them from using the services extensively.

As a result, she states that My Citi’s benefits are skewed to assist middle-income households rather than low-income inhabitants as it is more affordable to them (Jennings, 2015, Venter et al., 2018). Most low-income households in South Africa spend an average of 40% of their income on transportation costs, rather than the government-recommended 10%, (Transport Development Authority, 2016, City of Cape Town, 2017b, City of Cape Town, 2013).

The City of Cape Town conducts an annual benchmark research to assess how satisfied residents are with MyCiTi services. As demonstrated in table 1, there has been a significant drop in satisfaction pertaining to the transport costs or fares of MyCiTi of the BRT. City of Cape Town (2020) states that “the bus system is putting a financial pressure on most passengers; thus, the council are looking for any cost savings they can pass on to them.”

Table 1: level of satisfaction towards transport costs

LEVEL OF SATISFACTION WITH MYCITI				
	MEAN SCORE (OUT OF 10)			
	2017	2018	2019	2020
Costs/bus fare	9.2	8.9	8.4	8.1

Source: (City of Cape Town, 2020)

Allansson and Kajander (2017) states that one approach for the city to lower the cost of transport for inhabitants is to have two fare systems, one charging more during peak hours and the other charging less during off-peak hours. This allows travellers who travel during off-peak periods to save money. However, this has the disadvantage that only those who can adjust their working hours are able to do so; those who are unable to do so are compelled to either not travel to work or risk being late. Another problem of this strategy is that for most passengers, to save travel time, they are compelled to wait for the off-peak period to begin before using the system, squandering valuable time that could be utilized more productively. The passengers are also forced to arrive home late as they wait for more economical times.

2.6.2 City of Cape Town policy strategies

To solve the transport related spatial mismatch problem, Moyo et al. (2021) states that low-income settlements must be located near major road arterials to boost mixed developments (middle-income housing). However, they further argue that " this must be reinforced by appropriate land use and social policies that ensure low-income earners are not pushed out in the long run through rent bidding", (Moyo et al., 2021).

2.6.2.1 Cape Town Spatial Development Framework

The City has evolved towards working to reduce low-income households' "social exclusion" through increasing their "access" to resources, social and economic activities by integrating land use and transportation planning. Horn (2018) argues that this is in line with the spatial planning strategies or policies of the city such as "the Cape Town Spatial Development Framework (CTSDF)". The framework aims to ensure that the council provides more equitable access to job opportunities by lowering travel distances to economic activities and ensuring that development (commercial activities and industries) takes place along activity corridors and nodes (Watson, 2003, City of Cape Town, 2013). As a result, the city's land use management has changed toward creating an inclusive city, one that strives to bring economic opportunities and social services such as health and education services closer to people, as well as an efficient public transportation system that is close by to serve them (City of Cape Town, 2016)

2.6.2.2 The Built Environment Performance Plan

The city has developed the Built Environment Performance Plan (BEEP) to achieve this goal, which aims to reduce urban sprawl, encourage densification and intensification of the built environment, and integrate the public transportation network to promote economic growth and job creation in the city (City of Cape Town, 2017a, City of Cape Town, 2017b)

Under the BEEP (figure, 7), the north-south corridor, the western (where the study region falls), and the south-east corridor were recognized as three pathways that faced accessibility problems due to the inherited historical structure. The Western Corridor include the areas between Atlantis, Witsand (the study area), Mamre and Dunoon, as well as Table View. These areas were developed without a dedicated right of way, while the building of MyCiTi offered dedicated lanes connecting Atlantis and Witsand to Table View and the CBD (City of Cape Town, 2017a, City of Cape Town, 2017b). This has improved access to the CBD for these neighbourhoods and created opportunities for business development near BRT bus stations as well as growth toward Century City. The city now must focus on densifying and intensifying land-uses along the Western corridor to "bring operational efficiencies into the system," according to (City of Cape Town, 2017a).

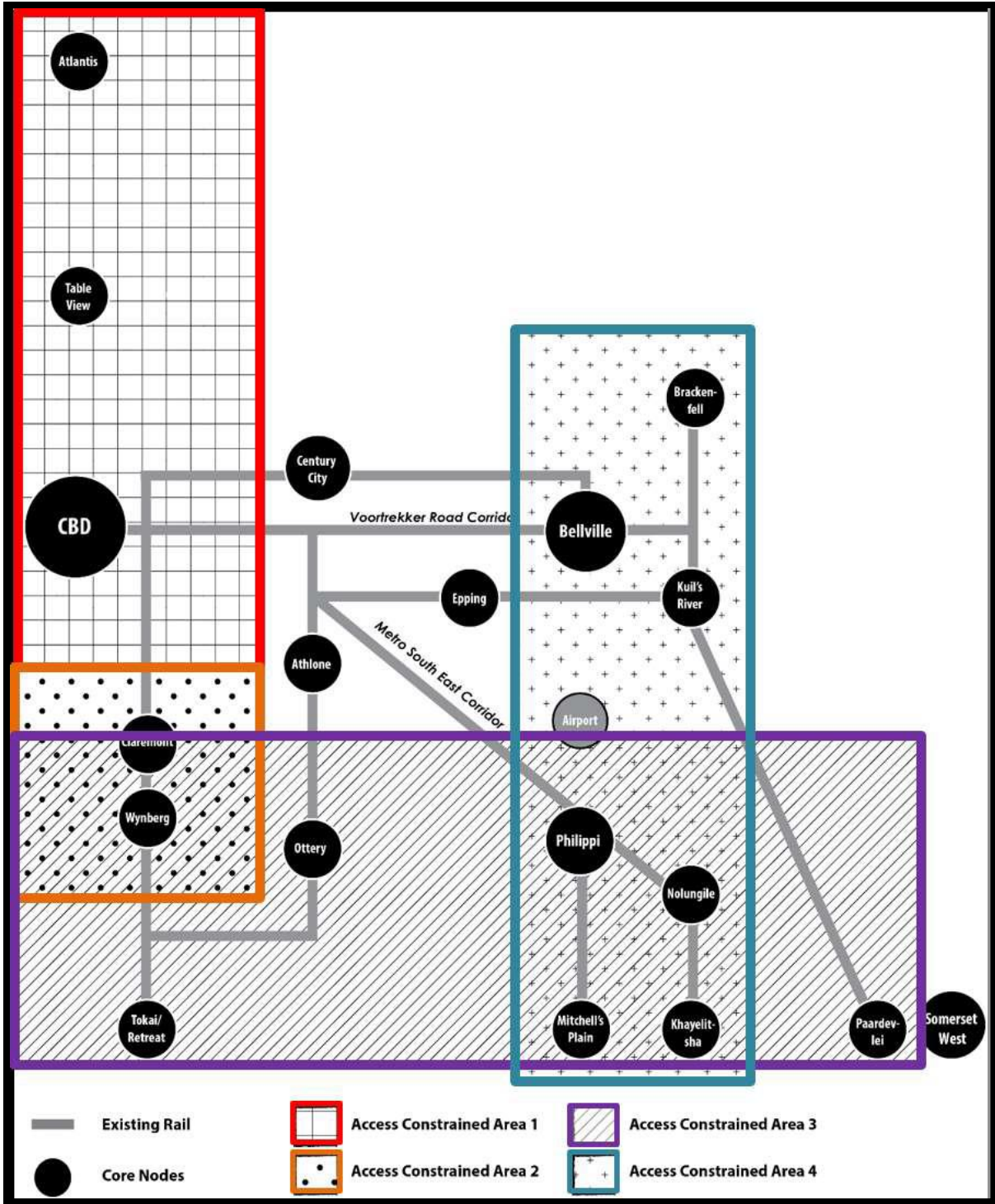


Figure 7: Corridors facing accessibility challenges.

Source: (City of Cape Town, 2017a)

2.6.2.3 The Integrated Development Plan

Another key strategy developed by the city of Cape Town to combine transportation and land use is the Integrated Development Plan (IDP), which coordinates the city's growth towards decreasing poverty and high transportation costs caused by inequitable spatial structure (City of Cape Town, 2017b, City of Cape Town, 2017a). The Integrated Transport Plan (ITP) was created to help execute the IDP by developing a public transportation system that is affordable for low-income households (Transport for Cape Town, 2015b, Transport for Cape Town, 2015a).

As a result, the Transport and Urban Development Authority (TDA) was established, with the mission of developing an affordable public transportation system that serves the urban poor (Transport Development Authority, 2016). The city has also developed an IPTN plan 2032 that focuses on transforming the city into a Transport Oriented Development (TOD) environment by emphasizing land use development along key railway and bus stations and their precincts to boost property values. It also emphasizes the integration of diverse types of public transportation to promote accessibility throughout the city.

2.6.3 Policy implementation on the ground

Efforts on the ground by City of Cape Town to reduce social inequality and marginalisation have started to show results. Moyo et al. (2021) conducted a study based on “Addressing Issues of Social and Economic Exclusion of Marginalized Groups, by developing an Integrated Land Use Transport Planning Model.”. The study shows that the city has encouraged manufacturing services and trade services to develop close to low income and middle-income residential areas. The research further notes that most low-income residents and those who live in informal housing in the southwest, central, and southeast suburbs are close to economic activities and the CBD, as indicated in figure 8, (Moyo et al., 2021). The figure also shows that manufacturing industries have also been developed in northern areas like Atlantis.

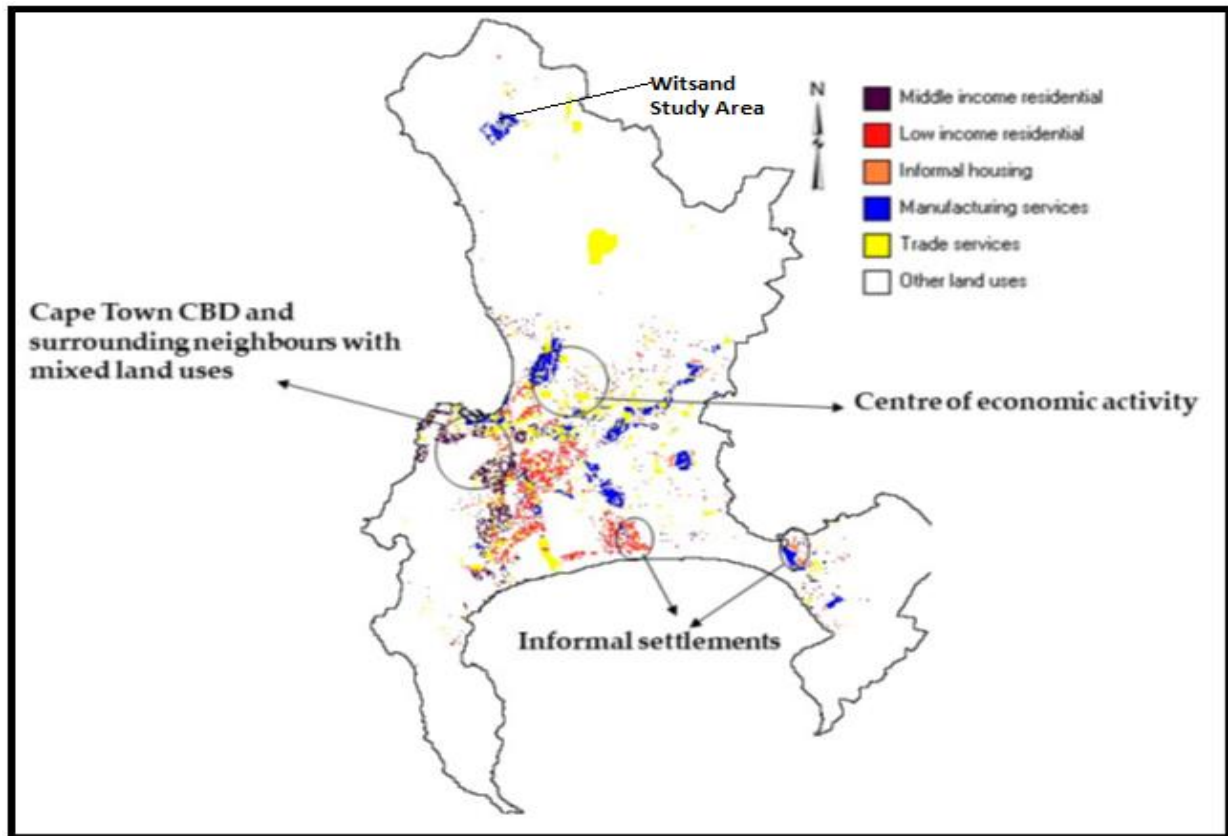


Figure 8: The proximity of Cape Town's low-income residential neighbourhoods to its commercial and industrial areas.

Source: (Moyo et al., 2021)

With the development of the BRT, manufacturing services have grown in some northern locations between 2010 and 2030, but zonal accessibility has remained low due to a lack of industry growth, (Moyo et al., 2021). It is worth noting that, even though Cape Town's economy has grown, most of the benefits are not available to low-income residents.

City of Cape Town (2016) state that "spatial consolidation of higher order enterprises in conjunction with increasing congestion levels has caused land value gradients to steepen from the CBD to the urban periphery," which has further exacerbated income disparities in Cape Town. They further argue that investing in MyCiTi and enhancing overall public transportation in Cape Town plays a critical role in reducing congestion, contributing to the city's extreme land value gradient being moderated, and resulting in positive spill overs to nearby suburbs (City of Cape Town, 2016). According to the Mayoral Committee Member for Transport for Johannesburg, Mrs Rehana Moosajee the building of a BRT shifts the city's focus to transit-oriented development (TOD) (Jennings, 2015).

TOD brings together companies, recreational facilities, buildings, residential areas, and public spaces within walking and cycling distance of public transportation (Goodwill and Hendricks,

2002, Transport Development Authority, 2016, Hrelja et al., 2020). TOD promotes agglomeration effects that can help cities flourish economically (Salat and Ollivier, 2017, Rosenthal and Strange, 2020). "TOD in the city has fostered medium to high residential density development along public transportation corridors like Wynberg and Claremont," (City of Cape Town, 2016). They go on to say that along the West Coast MyCiTi route, there has been an upsurge in high-density residential infill buildings.

2.7 Conclusion

In conclusion, literature has shown theories that talk about the bid rent theory and the trade-offs residents must face and these are reflected by the structure of the city notably for outlying poor settlements. The Bid Rent Curve theory states that there is a trade-off between housing costs and transport costs. Thus, by the venue of locating at the periphery of Cape Town, the low-income residents of Witsand would incur low housing costs but with opportunity costs of incurring high transport costs and poor public transport services. This results in the community being excluded from the main activities of the city owing to having low accessibility index. The transport-related social exclusion theory encompasses accessibility indicators which includes travel time and distance, travel costs, and travel experience (safety, reliability, and information) of the commuters. These indices or indicators of accessibility measure the inclusion and exclusion of settlements to the main activities of the city. Therefore, this study utilised these indicators of transport related social exclusion theory which border around accessibility as themes for analysis in chapter 4. The study shows that areas with low accessibility suffer from transport related social exclusion. The transport-related social exclusion theory states that communities like Witsand with insufficient mobility and located at the city periphery are excluded from taking part in all the major urban activities in full. Exclusion has the notion that it makes the society vulnerable to poverty as it impedes them from making savings or consuming products and services available to others. It also reduces their productivity at work as they must spend long hours of their time travelling. It also reduces access to formal jobs to the community and increases the formation of the informal market. What has further worsened the accessibility challenges in Cape Town is that its spatial structure is unequal as it has separated low-income housing from employment opportunities. It also has a radial transport system that has centralised all transport system to pass through the CBD. MyCiTi was then developed as a strategy to overcome these accessibility problems. The system operates buses that run on dedicated lanes that has created direct access to economic nodes such as the CBD, Epping and Paarden. It has also reduced congestion and improved the travel time for the commuters. City of Cape Town has also developed other policy strategies to combat these challenges like the Built Environment Performance Plan.

Chapter 3: Methodology

3.1 Introduction

The previous chapter appraised literature and underlying theories for the study. It looked at how having poor public transport systems creates low accessibility that in turn leads to transport related social exclusion. This leads to the community being excluded from socioeconomic activities of the society making them become vulnerable to poverty as their production, consumption and savings become limited. The Bid Rent Curve Theory showed that locating at the periphery results in low housing costs for the residents but has a negative effect of paying high transport costs that further worsens the social exclusion problem. MyCiTi was therefore, developed as a panacea to these issues.

The research methodology employed is discussed within the chapter. Succinct review of the philosophical approach was given followed by the study paradigm. The research strategy, “the unit of analysis,” and sampling plan were all justified. The process for collecting and examining the data was outlined in the chapter. Additionally, the research's constraints and ethical dilemmas, are discussed.

3.2 Philosophical approach

The study sought to evaluate the impact of MyCiTi to employment opportunities for the residents of Witsand. Transport related social exclusion is a complex social phenomenon in which people have limited access to employment opportunities thus affecting the urban poor. Therefore, this implies that the study is socially constructed by various actors, each of whom has a unique set of subjective meanings. The study directs towards a complex social phenomenon that has significant impact on the key social actors. The social actors are the people who live in Witsand, as they are the commuters of the mass transit. These social actors are influenced by this phenomenon and this research tries to make study and analyse this phenomenon.

This research, therefore, used a constructivist philosophical approach to interpret the residents' travel patterns both before and after MyCiTi was developed. The concept is founded on the idea that people construct meaning as they learn from their experiences in real-world settings, so they acquire knowledge by experience and doing, according to (Hein, 1991, Dogru and Kalender, 2007, Adom et al., 2016). The constructivism philosophical paradigm is based on the assertion that as people go about their daily lives, the experiences, and practices they encounter act as a building blocks towards their understanding and knowledge of the world(Adom et al., 2016, Honebein, 1996). Creswell (2007) states that effective constructivism requires to consider multiple experiences of the social actors towards drawing meaning from the complexity of their views.

The study, which seeks to examine and comprehend a phenomenon (travel behaviour) based on the observations and experiences of Witsand residents, relied on an interpretivist epistemological

worldview (Bhattacharjee, 2012, Hitchcock and Hughes, 2002). An interpretivism worldview states that research needs to take into cognisance the differences that are present between humans in their capacity as social actors as " they interpret their social roles according to the meaning they give to those roles," (Saunders et al., 2009).

Therefore, the aim of the study was to understand the travel patterns of the residents of Witsand from their perspective. The citizens' varied and distinctive experiences with the public transportation system can be understood through an interpretivism epistemological worldview. This, therefore, requires the researcher to interpret the meanings that the residents or commuters have about MyCiTi and Cape Town`s public transport system. It is from this interpretation that the researcher can inductively develop patterns of meaning from the context or situation. This emphasizes the reality beneath the situation's specifics to produce arbitrary interpretations and motivating behaviours, (Saunders et al., 2009). Therefore, the research is socially constructed by the primary social actors like the commuters, the urban poor and the local authority who are looking at accessibility with various meanings.

3.3 Research approach/ design

The pragmatism research paradigm is applied in this study. According to Tashakkori and Teddlie (1998) researchers employ the philosophical and/or methodological approach that is most effective for the specific study problem under investigation. Creswell (2014) argues that the researcher should stress the research problem and employ all methodologies accessible to comprehend it rather than concentrating on research methods.

Teddlie and Tashakkori (2010) further states that the research topic is a social science research, and as a result, pluralistic research methodologies are employed to acquire knowledge about the issue because it is not founded on a single philosophical framework. Tashakkori and Teddlie (1998) further argues that a continuum of ideologies can be adopted using the research paradigm as opposed to adopting opposing viewpoints. In order to make data collecting and interpretation practicable, Saunders et al. (2009) contend that it blends both interpretivism and positivist research perspectives. As a result, it gives researchers the ability to make operational choices based on "what will work best" in identifying solutions to the research challenge at hand.

"Both qualitative and quantitative methods may be used appropriately with any research paradigm as questions of methods are secondary to questions of paradigm," (Guba and Lincoln, 1994:105). In the work of Saunders et al. (2009), research topics rarely neatly fit into a single philosophical category, leading to the development of the research onion. As a result, the pragmatic research paradigm allows for the employment of mixed techniques, which combine qualitative and quantitative research approaches, in a single study. Despite the fact that constructivist philosophical approach was adapted for the study, which is more elicited in revealing qualitative data than quantitative data, Denicolo et al. (2016) argue that greater value is gained by making use of mixed methods.

3.4 Research Strategy

Malhotra (2017) defines research strategy as “a plan by which the activity of searching for and assessing information found in a research is carried out”. Saunders et al. (2009) state that research strategies are not mutually exclusive in that a survey strategy can be employed as a component of a case study. The research strategy used for this research was a case study.

3.4.1 Case Study Research

Case study research is defined as research method that is based on examining specific issues as they are happening within "its real-life setting," while making use of different sources of data or evidence (Creswell, 2007, Saunders et al., 2009, Robson, 2002). Whereas, Creswell (2007) views a case study research as a method in which a researcher explores or studies a bounded system/s (of cases) over a period of time by engaging in comprehensive, deep data collection by making use of different data sources or evidence so as to develop themes that describe the case/s. Case study research can come in different types either single case study, multiple case study, holistic case study, and or embedded case study (Yin, 2003).

Depending on the researcher's research assumptions, a case study may be utilized in positivist (quantitative) or interpretive (qualitative) research, (Malhotra, 2017, Benbasat et al., 1987, Walsham, 1995). A case study method can explain the why, what, and how questions of the research. As such, Saunders et al. (2009), argue that a case study research uses a variety of data sources known as triangulation, including interviews, desktop analysis, questionnaires, and observations, to assist answer the why, what, and how of the research.

A single case study research design was chosen for this study because it represents a unique situation and provides an opportunity to observe and analyse a phenomenon that few studies have taken into account, (Saunders et al., 2009, Creswell, 2007, Creswell and Zhang, 2009, Stake, 1995). Due to its distinctive location, that is being located at the periphery and being a low-income settlement, Witsand was chosen as the research's only case study. It is geographically separated from the city's primary socioeconomic activity as it is approximately forty kilometres from the core business area. The residents in the area are low-income households that live in RDP houses and wooden or iron shacks. Due to its outlying location, Witsand presents a possibility to conduct research that will show how the constructed BRT system affects underprivileged residential settlements located at the city fringes.

Creswell (2007) argue the analysis of case study research can be done either as an “all-inclusive rounded breakdown of the whole case or as an entrenched examination of an explicit feature/s of the case such as the history and chronicle of the case,". The researcher can analyse the case's primary topics or themes to understand the case's context and the lessons that may be drawn from it (Yin, 2003, Yin, 2009, Merriam, 1988, Lincoln and Guba, 1985, Lincoln and Guba, 1988, Guba and Lincoln, 1994).

3.5 Research method

3.5.1 Mixed methodology

This study employed a mixed methods approach where both qualitative and quantitative data collection techniques are used for the research, (Saunders et al., 2009, Creswell and Hirose, 2019). To address specific and distinct research questions, qualitative as well as quantitative methods were applied, which increased the wealth of the data outcome (Bryman, 2006b, Bryman, 2006a). This method was also selected for the study because collecting diverse types of data would provide a better understanding of the research question, (Creswell and Hirose, 2019, Tashakkori and Teddlie, 2003). In addition Saunders et al. (2009) argues that “ the method enables the researcher to evaluate the extent to which their research findings can be trusted and make inferences from them ” .

The qualitative technique is useful, according to Creswell (2007) since it allows one to explore and examine a collection of peoples` interactions, perception and behaviour towards unearthing different issues that may be quantified and include certain voices that are normally subdued. By speaking with those who are affected by the problems, qualitative research gives the researcher a thorough picture of the problems at hand. The researcher used qualitative data to record the behaviour, interactions, and perceptions of the residents of Witsand and their perceptions on accessibility issues (Creswell and Zhang, 2009).

Quantitative research focuses on collecting and evaluating data that can be organised and be represented quantitatively (Goertzen, 2017). It was employed for the advantage of mathematical manipulation in the form of graphical representations, descriptions, and comparisons of correlations and variables, such as establishing trip distance, travel duration, and travel cost for the citizens of Witsand.

3.5.2 Data sampling strategy

The study used surveys and interviews. Purposive sampling was employed for the focus group interviews to ensure that accurate and pertinent data was gathered for the study (Bhattacharjee, 2012). Saunders et al. (2009) states that this type of sampling, is carried out to help the researcher acquire information rich responses that specifically answer the research objectives and questions. Participants interviewed were experts in transport planning from City of Cape Town who had long time expert knowledge of the subject matter and area.

Snowball sampling (further explained under 3.5.2.1) was used because identifying the members of population that resided in Witsand before MyCiTi was developed at face value was difficult, (Saunders et al., 2009). Creswell (2007) and Saunders et al. (2009) state that snowballing is based on identifying the initial contact within the population who are information rich over the research and using them to identify other cases of people who are information rich. Thus, these people will continue to identify other members of the population till the researcher has his sample size. the

method works by “identifying one or two cases in the population and these cases identify further members of the population for the study, and thus this process continues until no new cases are given, or the sample is as large as is manageable” (Saunders et al., 2009).

3.5.2.1 Snowballing process

1. Identify potential population subjects

The snowball sampling method's initial stage was to identify possible population subjects. This requires beginning the data collection process with one or two sources. According to Panacek and Thompson (2007) the research's subjective requirements, such as age or the need for a representative sample, must be met by the possible participants.

Therefore, the snowballing process in Witsand was conducted by first identifying the first cases for the snowball sampling process. To do so intercept surveys were done at MyCiTi bus station in Witsand and during the trip to Cape Town civic centre. Intercept surveys are based on intercepting a respondent as they are engaged in carrying out their day-to-day activities like riding a bus or walking, (Richardson et al., 1995). The initial population were asked entry questions to see if the participants were eligible for the survey. The question included:

- a. Did you live in Witsand prior to the introduction of MyCiTi?
- b. Do you have to travel for your job?

The next step was to inquire about the subjects' interest in taking part in the study. Those who agreed became the study's initial subjects, and the researcher continued to contact them by phone or by scheduling a visit to their household.

The third step was to ask the initial subjects that qualified to be part of the study from the intercept surveys were subsequently asked to recommend or identify other residents who used to live in Witsand before the BRT, to be prospective respondents thus resulting in snow-ball sampling. Thus, the referral procedure was continued until a sample size big enough to yield useful data was obtained.

3.5.3 Sample Size

Due to time and budgetary limitations, it is not feasible to collect data from the whole Witsand population. As a result, selecting a representative sample from the population is a more effective method. As result, a small sample of Witsand was used to represent the entire population. The study employed a mixed method research and in terms of qualitative research Boddy (2016) states that the recommended sample size for case studies is between 15 and 30 respondents or interviews.

Whereas, Sandelowski (1995) and Hanmer et al. (2000) argue that the sample size for qualitative research can increase to 50 respondents or interviews if it is constructivist research or to have a deep approach to scientific research. Boddy (2016) states that a sample of more than fifty can be used if the qualitative research is taken under a "positivist approach to research using a qualitative

measurement instrument like a questionnaire.” He further argues that using a higher sample size enables a more representative understanding of likely incidence rates so that questions can be prioritised in terms of inclusion in any questionnaire, (Boddy, 2016).

In terms of quantitative data, Cohen et al. (2002) and Delice (2010) state that if the research is a survey research, a sample of 100 should be used for each major sub-group in the population. The population of Witsand consists of 5000 people and the working population constitutes approximately 2500 of the population. The target population constituted of the working population that used to reside in Witsand before MyCiTi was developed and the precise number was impossible for the researcher to estimate. As such the initial target size for the study was one hundred and twenty (120) people but the number of people that the researcher managed to survey for the study were a total of one hundred and five (105) people.

The one hundred and five sample size permitted the researcher to finish the investigation within the limits of time and money. In addition, the sample size enabled the researcher to reach data saturation. Marshall et al. (2013) defines data saturation as gathering data to a point of diminishing returns that is to a point when there is no new information or data sets being added to the research. For the study, the researcher noted that at 90 questionnaires or respondents there was no new data being noted from the research. This was identified due to the replication of data that already had been collected from the survey.

3.6 Data collection techniques

The section looked at the methods or strategies applied for collecting the study's data. Multiple sources, including observations, interviews, geographic information systems, and questionnaires, were used. Desktop research was used to set out the issues to be investigated and informs the questions to be asked and line of inquiry. Obtaining data from multiple sources is a good research practice as “it creates a stronger research outcome” (Malina et al., 2011). The following methods were utilized:

3.6.1 Survey questionnaires

The study relied on questionnaires for the survey because they "provide an objective method of gathering data about people's knowledge, beliefs, attitudes, and behaviour", (Boynton and Greenhalgh, 2004, Oppenheim, 1992).

The survey consisted of a questionnaire attached in appendix 1, that examines Witsand residents' travel habits before and after the MyCiTi BRT system was deployed in their neighbourhood towards better understanding their accessibility difficulties. The survey is a retrospective questionnaire that asks respondents to recollect their travel habits and issues prior to the introduction of MyCiTi. The questions identify barriers to work, such as transportation costs (Costs of transportation, miles travelled, or an insufficient time). There are also some queries aimed at

determining the BRT's impact, like any changes in job prospects prior and later changes, after the BRT was implemented.

Based on Behrens and Mistro (2010), respondents in retrospective research may recollect their travel behaviour from 30 years ago if they had not experienced any big life changes such as getting robbed or changing their houses. The respondents were able to provide first-hand information on the research area because they had lived in Witsand for a considerable amount of time before the BRT was built. However, the researcher also notes that memory accuracy may have deteriorated over time, which may impact on the accuracy of the information obtained.

3.6.2 Focus Group interview

Focus group interviews were also used because “they gather valid and reliable data that is relevant to the research question(s) and objectives.” (Saunders et al., 2009). Focus group participants are purposively selected as they are knowledgeable to the study area, (Thomas et al., 1995, Rabiee, 2004, Burrows and Kendall, 1997). Thomas et al. (1995) had argued that focus group interviews are better than one on one interviews as they encourage interaction between the respondents which results in richer and deep diverse views being collected.

The interview was structured based on a predetermined and standardised questionnaire, (Longhurst, 2003, Harris and Brown, 2010). Green and Thorogood (2004) made the point that was later buttressed by Krueger (2014) that the group should have similar characteristics or be in cooperation so that they engage and discuss freely among themselves.

The respondents were interviewed as a focus group because of their shared municipal job and desire to be interviewed at the same time. These interviews yield quality results, if the “interviewees are similar and cooperative with each other, when time to collect information is limited, and when individuals interviewed one-on-one may be hesitant to provide information” (Creswell, 2007, Krueger, 2014, Stewart et al., 1990). However, Burrows and Kendall (1997) had argued that if respondents know each other they may be discouraged to share ideas and views comfortably as they will feel prejudiced or criticized before their higher ups or colleagues.

Six key interviewees from the municipality's transport and mobility division were interviewed by the researcher. They were suitable as sources of data because of their experience as transport planners and being well versed in accessibility issues around the development and management of MyCiTi. Attached in appendix 2 is the form that guided the desktop research for the local authority.

3.6.3 Observations

Comprehensive data was collected for the study through observations of people and occurrences in their most natural settings (Baker, 2006). Several field inspections were conducted to document the system's infrastructure and create a visual view of the residents travel habits, which would supplement the information gathered from the surveys. Photographic works were used in that photographs were taken to document prominent issues such as bus stops. Another important piece

of data gathered through observations was the cost of travel for other forms of transportation, which was crucial for comparing the cost of the BRT to other modes of transportation.

Participant observation was the type of observation method used for the study. It is described as a method by Musante and DeWalt (2010) in which the researcher participates in the "daily activities and interactions" of a group of individuals in order to learn about some facets of their life. This contributes to raising the quality of data collected. Thus, the researcher assimilated into the Witsand community during the data gathering period. The researcher started the process of observation from the trip origin within Witsand and travelling to the various work destinations that those residents travelled to, including Parklands, Melkbosstrand, Waterfront, Civic Centre, Sea point, and Rondebosch, starting. The researcher, like the locals, used a variety of public transportation options, such as walking to bus stations, and participated in the waiting times necessary to complete the trip. Consequently, the observations were made both at the bus stops and while in transit.

The researcher would interact with the commuters in a variety of ways both while they were on the bus and after they got off at important bus stops. Examples of these places include "The Point" areas in Melkbosstrand and Parklands, where Witsand residents congregate and wait for residents in those areas to select them to perform various domestic tasks at their homes, such as gardening, painting, dog-walking, and housekeeping. As the commuters waited to be chosen, the researcher would also speak to them directly.

By boarding various forms of local public transportation, the researcher gathered information on their fare cost. The researcher will ride to various work locations where the locals are engaged by paying the cost of travel for Sibanye buses, MyCiTi services, and Mini-bus taxis. This made it possible for the researcher to record and compare the current prices of travel.

3.6.4 Geographic Information Systems (GIS)

GIS was another tool employed in the research. The mapping software of the GIS was used to visualise and analyse geospatial information. It was used to display the spatial distributions of accessible employment places for the residents. The data from the BRT routes and the statistics from Cape Town's job centres or economic hubs were integrated. It was also connected to the fields of employment reported by the survey respondents. The Civic Centre, industrial sectors, business hubs like Century City and Claremont, and major tourist regions like Waterfront were some of the employment areas with high concentration of offices.

3.6.5 Documentary / Secondary research

This refers to the utilization of already released data, such as newspaper articles, which are relevant to the research project at hand. Other government documents were utilised, and these were crucial to gather expert assessments and perceptions on accessibility issues from different views. These were used in literature review and in chapter 4 of the findings. Example of such include newspaper

articles as shown in appendix 4, 7 and 9. While appendix 8 is the map that shows the MyCiTi routes operating in Atlantis from the Transport for Cape Town the 2015 edition. Other documents used in the study are government documents cited in the Bibliography such as the Public Transport Strategy, Technical Report by Department of Transport; Transit oriented development; City of Cape Town TOD strategic framework from Transport Development Authority. Some of the documents were from City of Cape Town such as: Comprehensive Integrated Transport Plan (CITP): 2013 Review; Cape Town's Transport Picture 2016; Built Environment Performance Plan (BEEP) 2017/18; Profile and Analysis District Development Model; City of Cape Town Profile and Analysis District Development Model.

3.7 Unit of analysis

The "unit of analysis" is the object being investigated by the study, (Dolma, 2010). The object is viewed as the "who or what for which information is analysed and conclusions are made" (Sedgwick, 2014, Kumar, 2018). Whereas (Neuman and Rossman, 2006) and Khan (2014) views the unit of analysis as the components, cases, or portions of social life that are being studied.

Thus, the entity or issue that the researcher is investigating or observing is referred to as "the unit of analysis". The units of research can vary in a study from individuals to groups, societal units, spatial units, relationships, lifestyles, and settlements (Rosenberg, 1968, Babbie, 2005, Lofland and Lofland, 1995).

Kumar (2018) states that the "unit of analysis depends on the research problem." Therefore, for the study, it is accessibility to employment opportunities for the residents of Witsand. Platow et al. (2012) and Kumar (2018) state that after determining the unit of analysis, the researcher must determine the variables for analysis. The variables for analysis of the study are the measurements or indicators of accessibility as noted in figure 1 being travel time and distance, travel cost, and travel experience.

3.8 The survey processes

The data was collected once the researcher's ethics clearance had been approved, attached in appendix 5. The study was conducted between 5:00 a.m. and 1:00 p.m. during weekdays (working days), with respondents being approached while they waited for their buses. The researcher then went to the various respondents who had been snowballed by the respondents from the intercept surveys, and this was done between 17.00 and 19.00 after the respondents returned from work. The respondents were given 24 hours to complete the questions to the survey questionnaire and the form was collected the next day. This was done to adhere to Covid 19 social distance rules, to reduce interactions with the respondents and risk spreading the virus.

The languages used were English and Xhosa, depending on which language the respondents preferred to use. This was made easier as the researcher was familiar with both languages.

3.8.1 Questionnaire administration

When addressing each respondent, the researcher distributed the questionnaires while adhering to all Covid 19 standards, such as wearing a mask and sterilizing. The researcher administered the questionnaire in two ways. The first way was to deliver the questionnaire form (Appendix 1) physically to the respondents' homes and explain the essence of the research and what was expected of them. It was handed out together with the consent form providing the respondents the choice to either consent to be part of the research or to decline.

The second way of administering the questionnaire was an online survey using mWater platform. This was done by sending the questionnaire link to the respondents on their phones, enabling them to answer the questions online. This was done to avoid interactions with the responders and to comply with the standards of Covid19 for social distancing.

The researcher took a period of 1 day to identify people to whom to give the questionnaire. One hundred and twenty questionnaires were administered to the residents of Witsand but only 105 managed to return them thus providing a response rate of 87.5%.

3.9 Data coding

The section looks at how the data was collected and coded for processing and analysis.

3.9.1 Data capture

Before the data can be coded, the first step was to capture the data responses from the respondents and entering it into an electronic data-file, (Jones and Hidiroglou, 2013). The electronic data-file that was used to collect data for the study was called the “mWater platform”. The survey questionnaires, physically filled by respondents were then keyed into the data-file by the researcher. This enabled all the responses of the respondents to be captured and stored electronically. For those who used the online survey questionnaire, the responses were automatically captured by the system.

3.9.2 Data coding

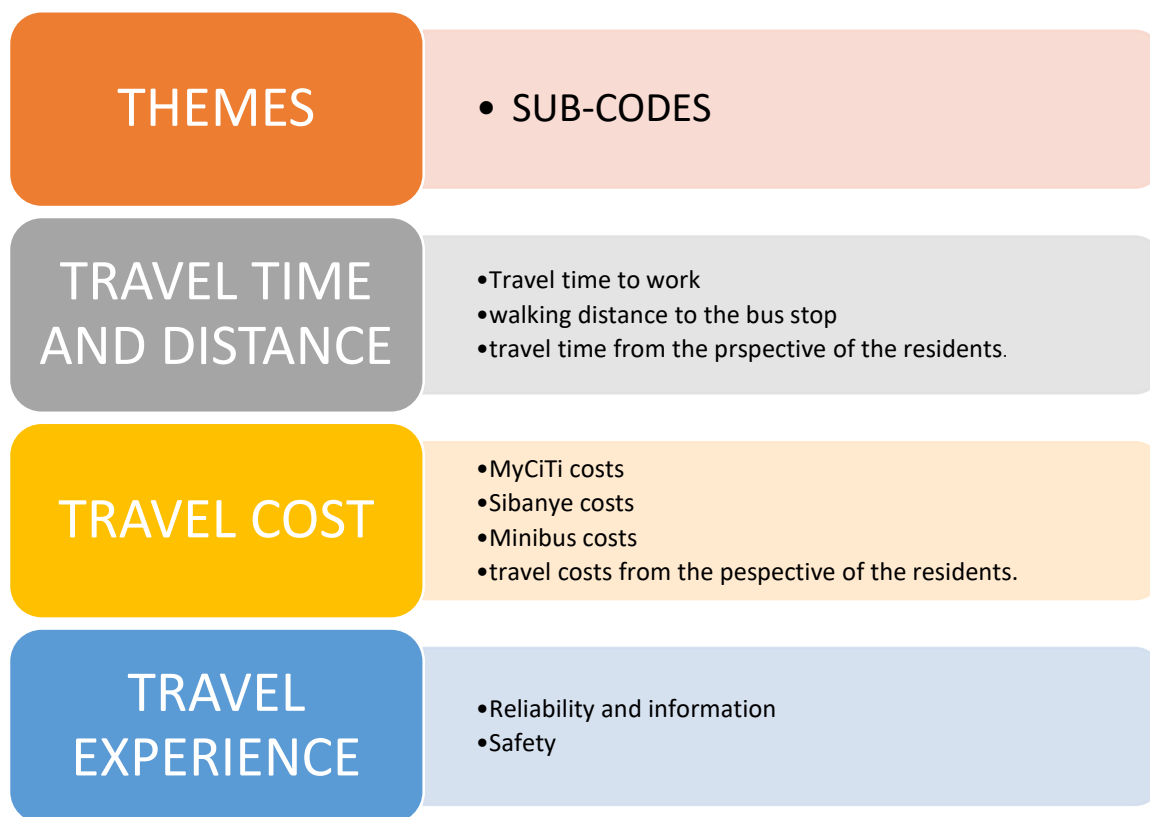
Data coding is the translation of data into labelled categories so that the data is in numerical labels and can be processed and analysed by the computer, (Richardson et al., 1995, Jones and Hidiroglou, 2013). There are different codes in which the data can fall into, and these include, ratio codes, interval codes, nominal codes, and ordinal codes, (Saunders et al., 2009). In this study each respondent was given a unique code for their identification. For example, respondent 1 was given the unique code A52MZZ and respondent 2 was given the unique code A52NJZ.

3.9.2.1 Data coding for the Survey Questionnaire

Research data are given values, labels, and categories through the process of coding, which is based on established rules, (Burla et al., 2008). White and Marsh (2006) and Burla et al. (2008)

state that the coding method for quantitative data must be chosen in advance, that is, whether to use text or numerical codes. As a result, the codes for the survey questionnaire were created from the literature and are concept-driven, also known as deductive analysis (Gibbs, 2007). Therefore, for the study, the codes were created before the coding process started.

According to Linneberg and Korsgaard (2019), when the transcripts are being coded, the researcher begins to search for concepts that correspond to the code in the transcripts' content. As a result, associations between data discoveries are mapped to the precise categories or codes that have already been defined. Based on Soiferman (2010) deductive analysis enables the researcher to identify themes or problems that are crucial to their study. Graph 1 shows the themes and sub-codes used under the study.



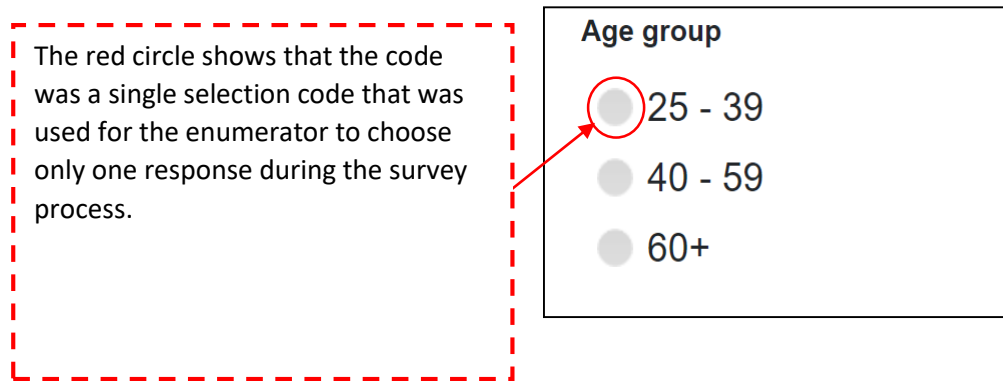
Graph 1: Themes and Sub-codes used for the study.

Source: The researcher's own creation

The survey questionnaire utilised both qualitative and quantitative data. When the survey questionnaire was drafted, the different data codes were already inputted into the questionnaire, (Richardson et al., 1995). Data coding was done during questionnaire designing to simplify, organize, and to help make data analysis easy. For example, ordinal codes used in the study are codes for travel modes which were ranked in order of priority. For instance, 1 was for MyCiTi, 2 was for Minibus taxis, 3 was for Golden Arrow buses and 4 was for walking. Ratio codes used

were for the age of the respondents and interval codes were for travel time for trips to and from work.

Data coding was carried out in Excel as part of the investigation as a means of giving numerical or textual values to the field answer data obtained. Each response's code was manually entered into the downloaded data file from mWater. For instance, a question asking for the respondent's age group was coded with a single option code, requiring the enumerator to choose just one response from the survey tool. The survey instrument identified the single coded response as a dot as shown in graph 2.



Graph 2: Identification of single coded responses.

Source: The researcher's own creation

On questions that needed more than one response, such as the one that asked about the respondent's means of transportation, a multiple selection coding was done. Rectangles were used to indicate the multiple selection coding as shown in graph 3, which indicated that the enumerator would select numerous responses from the survey instrument.

For the same trip do you use other modes of transport (taxi/walking to get to the bus)?

- MyCiTi
- Minibus taxis
- Golden Arrow bus
- Walk
- Car as passenger
- Car as driver
- Train
- None
- Other (please specify)

The red rectangle shows that the code was a multiple selection code that was used for the enumerator to choose multiple responses during the survey process.

Graph 3: Identification of multiple coded responses

Source: The researcher’s own creation

In order to determine responses that required numerous responses with diverse factors, a matrix coding method was also used. As illustrated in graph 4, the matrix was used to rate two different variables that were connected together and to determine if one variable was dependent or not:

How have the following changed, compared to 2013?

	Affordability	Travel time	Work opportunities
much better	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
better	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
no change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
worse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
much worse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
not sure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Graph 4: Identification of matrix coded responses

Source: The researcher's own creation

3.9.2.1 Data coding for Qualitative Data (Interviews)

Since the codes were generated based on the interviewees' responses, the analysis of the qualitative data specifically gathered from the interviews with the City of Cape Town municipality was primarily inductive. In order for them to better relate to the study topic and questions, key elements that emerged from the interviews were highlighted.

The responses from the collected data were text based. The researcher took notes and transcribed (wrote) down all the information that the main informants provided while being interviewed. As a result, the responses were manually recorded in the researcher's notebook, resulting in transcripts of the data. In the second stage of data coding, all transcripts were reviewed, and common codes, concepts, and significant insights offered by the respondents were noted. Thus, a variety of codes were employed, including verbatim, which involved using the respondents' exact words, and phrases, and included using the respondents' repeating phrases. Descriptive codes, which required labelling data in brief phrases, are also used, (Williams and Moser, 2019, Saldaña, 2021).

The third phase involved noting or annotating the transcripts by assigning codes to pertinent words and sentences in order to assist organize the material. As stated by Gibbs (2007), this involves putting the data into a format that can be analysed by giving it a descriptive title. Additionally, this procedure makes it possible to identify related content throughout the data collection. The data needed to be conceptualized, or aligned with important concepts, as the following stage. In the annotation stage, codes were organized into categories and subcategories. Codes that were considered unnecessary were removed, and some were combined to reduce duplication and produce codes that were pertinent to the study. In accordance with Williams and Moser (2019) and Creswell (2007), this is the point where all the categories identified in the data findings are integrated and centred on one or more core categories, hence generating interrelationships. By establishing links between the many categories contained within the data, the researcher later segregated the data. This was done to ensure the coherence of all the findings' data.

The categories were subsequently placed into a hierarchy, or segmentation. As a result, the classifications or codes were ordered by importance. As example, primary codes were designated for important codes, whereas level 2 or level 3 codes were designated for less important codes. The major categories for analysis were established as primary codes (Saldana, 2013). This staged also aligned the qualitative data with the quantitative data so as to improve the quality of the data analysis. Grid 1 shows how the data coding for the study was undertaken for the interviews:

OPEN CODES/ CODE LEVEL 1	CATEGORIES/ CODE LEVEL 2	THEMES/ PRIMARY CODES
<ul style="list-style-type: none"> • Phase 1 • No train services. • Poorly connected public transport services • High transport costs • Congestion • Trip modelling exercises 	<ul style="list-style-type: none"> ➤ Challenges faced before the development of MyCiTi. ➤ Stage of development ➤ Pre-development exercises. 	<ul style="list-style-type: none"> ❖ DEVELOPMENT OF MYCITI
<ul style="list-style-type: none"> • Services running throughout the day. • Increased travel frequency • Development of commercial activities along MyCiTi routes • Increased densification • Reliable services 	<ul style="list-style-type: none"> ➤ Integrated transport infrastructure ➤ Transport Oriented Development ➤ Improved travel time 	<ul style="list-style-type: none"> ❖ ACCESSIBILITY IMPACT
<ul style="list-style-type: none"> • No direct MyCiTi bus services operating within the community. • Travel long distances to first bus stop. • Minibus taxi operators forbid the operation of MyCiTi services within Witsand. • Volatile relationship of bus operators and minibus taxi operators • Inactive MyCiTi infrastructure 	<ul style="list-style-type: none"> ➤ Service challenges ➤ Financial challenges ➤ Operational challenges ➤ Structural challenges ➤ Community problems 	<ul style="list-style-type: none"> ❖ CHALLENGES FACED

<ul style="list-style-type: none"> • High transport costs • High operating costs • Unequal spatial city structure • Long travel distances • Lack of funding 		
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Grid 1: Data coding for interview data

Source: The researcher’s own creation

3.10 Data analysis

Richardson and St Pierre (2000) states that analysis allows you to identify patterns and meaning from data that has been collected and described in numerous ways, such as means and standard deviations. Data analysis for this study was done using classification or categorization of meanings. This method is founded on "creating categories and, subsequently, linking these categories to relevant bits of data" (Saunders et al., 2009). There are three ways that a researcher could use to generate themes for their data: by deriving them from the data or from literature, or from using the actual terms used by the respondents (Dey and Astin, 1993, Corbin and Strauss, 2008a, Corbin and Strauss, 2008b, Saunders et al., 2009).

The study used both the inductive and deductive methodologies, with the latter being primarily used. Azungah, (2018) argues that for a deeper grasp of the subject being researched, both inductive and deductive research methods can be used together. When the themes that are used in data analysis are generated from the empirical data, which is known as the inductive approach or and if they are generated or emerged from the characteristics of the phenomenon under study or from scholars as noted from literature review, they are known as deductive approach (Ryan and Bernard, 2000, Ryan and Bernard, 2003, Dey and Astin, 1993).

Yin (2003) states that literature review or theory can help a researcher shape and direct their data analysis. Yin (2009) argues that this will improve the consistency, accuracy, and internal validity of the study. However, this method has the negative effect of causing the researcher to be rigid and prematurely shut off other issues that may arise as they conduct their research (Bouncken et al., 2021a, Sinkovics, 2018). To avoid this error, the researcher has utilised themes from literature and from the actual terms used by the respondents.

3.10.1 Identification of themes

The Transport-Related Social Exclusion Theory, which is described in the literature review chapter under 2.3.2, provided the main themes that served as the basis for the analysis of the data. They were also generated from the actual terms used by the respondents. Thus, this provided the structure in which the research findings for chapter 4 were organised. Dey and Astin (1993) made

the point that was later buttressed by Saunders et al. (2009) that the themes should be meaningful to the data and to each other.

Given that the research employs both inductive and deductive research procedures, its themes and analytical codes are built on flexible pattern matching approach (Bouncken et al., 2021a, Bouncken et al., 2021b). Saunders et al. (2009) defines template as a “list of codes or categories that represent the themes revealed from the data that has been collected”. King (2004) states that the codes and themes from template analysis can be predetermined from literature and are thereafter modified as the data is being collected and analysed. He further argues that template analysis is more flexible than other methods of qualitative analysis as it allows patterns and relationships to be explored, (King, 2004). Thus, empirical data from the field was compared from the predetermined themes but these were also modified considering the data and the actual responses of the respondents.

Therefore, for this study, the identification of themes was based on the Transport-Related Social Exclusion theory. The themes were later modified during data analysis based on the actual terms used by the respondents and from the data. Accessibility is defined as the ease with which one can go from place to place (Grengs et al., 2013, Levine et al., 2012). According to the Social Exclusion Unit (2003) the following questions can assist to determine a location's accessibility:

- Do people have access to the services they need in a timely manner and at a price they can afford?
- Are the services accessible at a reasonable distance or drive?
- Does the general people know about public transit, and is it reliable and safe to use?
- Is the public transportation system physically accessible?

Thus, the themes used for the analysis obtained from literature are measures of accessibility. To further enhance the significance of the data, the study additionally included actual terms that the participants used.

3.10.2 Data Analysis Tools

Excel was used to analyse the data from the survey, which enables the analysis of large collections of questionnaire data to be done using a variety of approaches, such as frequency analysis and response variations, which are discussed in greater detail in the next chapter (Richardson and St Pierre, 2000). Richardson et al. (1995) states that Microsoft excel is a spreadsheet and database program that enables data to be captured, edited, and analysed with ease. This produced graphs and figures that aided in data analysis.

For the qualitative data, specifically the interviews, the manual method of coding was used. Manually coding qualitative data, according to Bodine (2021), entails looking through the research data and manually creating and assigning codes and themes to them. Through the coding process, it allows the researcher to be adaptable and innovative and affords them a deeper grasp of their data, thus increasing transparency. The themes were created using inductive analysis, and they are

consistent with the objectives and research questions of the study as stated in the section on data coding in Section 3.9.2. The problem with this approach is that the researcher's cognitive biases, specifically how they recollect all the codes, influences the coding process. The procedure is very laborious and tedious.

The data from the questionnaire about workplace destinations was coded into the GIS mapping software to show the various work destinations for the residents of Witsand before and after MyCiTi was developed. This demonstrated how MyCiTi has affected their ability to access employment possibilities on a spatial level.

3.11 Validity and Reliability

Validity and Reliability affect the accuracy, consistency, and quality of the research, (Yin, 2009). Validity is the degree to which the outcomes of a research are adjudicated to be a true and reliable expression of the population being investigated, (Joppe, 2000). There are two types of validity that can be measured, and these include internal, and external validity (Joppe, 2000, Miles and Huberman, 1994, Pandey and Patnaik, 2014, Lincoln and Guba, 1985, Lincoln and Guba, 1988, Saunders et al., 2009).

The degree to which observed changes in the dependent variable are directly related to the independent variable is referred to as internal validity by Baldwin (2018) and Cahit (2015). Thereby, are the results fair and accurate in describing the respondents' experiences? In contrast, external validity measures how broadly the study's findings can be applied outside of the sample that was used for the study (Winer, 1999). Are the conclusions applicable or transferable to different environments?

The type of validity measure used for the study was internal validity. This is because external validity does not apply to this study, as the findings cannot be generalizable, as they are peculiar and specific to Witsand, the chosen context. Therefore, the findings might not necessarily apply to the next township (which will be unique in character). As such internal validity is the most relevant to the research.

The questionnaires' internal validity, or "the ability of the questionnaire to assess what it was designed to measure," was examined using its content also known as content validity (Saunders et al., 2009). "The extent to which the questionnaire's questions expose or cover the research issues is known as content validity," (Saunders et al., 2009). As a result, the researcher conducted a thorough literature review to make sure that the questionnaires had adequate and satisfactory coverage of the research and that only key items were included. The researcher also consulted other researchers to determine the value and importance of each questionnaire item.

Reliability on the other hand is based or is defined as "proving that the actions or events of a study, such as the data collection procedures, can be replicated with the same results" (Saunders et al., 2009). The test for inter-rater reliability, the test for test-retest reliability, and the alternate form or

the internal consistency reliability test are all methods for measuring reliability (Pandey and Patnaik, 2014, Schuringa et al., 2014, Heale and Twycross, 2015, Saunders et al., 2009).

The access reliability, the researcher made use of the alternative form test. This test according to, Mitchell (1996) and Saunders et al. (2009) is based on making use of check questions within the questionnaire. These questions are the same questions but are either placed at different points of the questionnaire or worded differently but are essentially the same. Thus, these questions enable the researcher to check if the respondents provide similar answers to the same question. Saunders et al. (2009) argues that `check questions` have a disadvantage of increasing the length of the questionnaire. Subsequently, the researcher included check questions within the questionnaire to ensure accurate responses from the respondents.

3.12 Limitations

Several challenges were faced in conducting the research. One limitation for the research is that the study is case-based research. As such the potential limitation of such research is that the findings cannot be generalizable, as they are peculiar to Witsand, the chosen context and the findings might not necessarily apply to the next township (which will be unique in character). However, Yin (2003) argues that a case study research enables the researcher to collect in depth information that can show what is actually happening on the ground to similar cases.

Another challenge about the research is that it is retrospective research that requires respondents to recall events from the past. The challenge such a study has is that some respondents could not remember the precise length of their trips as they had become blurry over time, however, they provided the estimates from the best of their memory retention capacity. Behrens and Mistro (2010) however argue that respondents in retrospective research can recollect their travel behavior from 30 years ago if they have not experienced any big life changing events like a robbery or changing homes. Since the respondents have not relocated, their ability to recall their travel behavior from 10 years ago was not a significantly detrimental to the study.

Another challenge encountered is that the compilation of the data was conducted through the Covid 19 pandemic, and this resulted in numerous delayed administrative processes. The application to get approval from city of Cape Town to administer the interviews took longer than anticipated. The city has initiated a new online system for research purposes and due the system being at its infancy of development, it took a lot of system hiccups that delayed the system and the research at large. What further affected the study was the Covid-19 pandemic as accessing the people to administer the interviews were not easy and the entire process ended up being delayed by bureaucratic red tape. However, after all these problems were sorted out, the focus group interview was conducted successfully.

Covid pandemic laws brought on restrictions on the researcher. For example, the social distancing protocols required the researcher to exercise caution in interacting with the respondents. Thus, the researcher had to adhere to the pandemic protocols such maintaining a safe gap from the

respondents while constantly donning a mask during the survey. Consequently, facial expressions and other body language, a key aspect of communication in qualitative study inquiry was somewhat hampered. The researcher also reduced interacting by permitting the respondents to keep the forms overnight and complete them at their time and be collected the next day at their convenience. The researcher also provided an online platform in which the respondents would answer at their own time.

3.13 Ethical considerations

Due to the research's emphasis on human behaviour, the researcher applied for university's approval for the ethical clearance (appendix 5). The ethical clearance ensures that the dignity and welfare of the respondents are protected, and no harm will be brought upon them due to the study being undertaken.

The confidentiality rules for personal and sensitive data collected bind the researcher. The researcher did not compromise or use the material for any reason other than for the study. The identity of all respondents both for the survey and the focus group interviews were kept anonymous and each respondent was assigned a unique code that separated them.

In addition, before distributing the questionnaire, to ensure their willingness to engage, the respondents' permission was sought after. Thus, the consent was received from respondents, (appendix, 6). The study was conducted, and all information and records obtained were accessed by the researcher only and were used within the limitations of the consent given that is, the information was used for research purposes only.

Before providing clearance to conduct the focus group interviews, the city authorities, required the researcher to outline how the information they provided would be analysed and kept anonymous. Thus, to ensure this, the researcher provided the outline and had to agree to keep the names of the city of Cape Town respondents anonymous for their protection and wellbeing.

3.14 Conclusion

The constructivist worldview was adopted as the research's philosophical approach. This is due to transport related social exclusion being a complex social phenomenon in which people have limited access to employment opportunities thus affecting the urban poor. Therefore, this implies that the study is socially constructed on various levels by the role players involved with various subjective meanings. The study directs towards a complex social phenomenon that has significant impact on the key social actors such as the residents of Witsand. Therefore, interpretivism was adapted because the experiences of the residents as they utilise the public transport system are different and unique. This, therefore, requires the researcher to interpret the meanings that the residents or commuters have about MyCiTi and Cape Town's public transport system. It is from this interpretation that the researcher can inductively develop patterns of meaning from the context or situation. Since Witsand represents a singular case and offers a chance to observe and examine

a phenomenon that few studies have considered. The research employed a pragmatism research paradigm so as to adequately research and answer the research problem. As a result, a mixed methodology was adapted, which involves the use of several research techniques for the study such as questionnaires, observations, geographic information systems, interviews, and documentary research. The data was captured and coded in mWater. The analysis themes were generated from literature but were changed considering the empirical results. Limitations and the ethical issues that occurred during the research were also examined.

Chapter 4: Data presentation and Analysis

4.1 Introduction

The chapter before looked at techniques and methodology employed towards answering the key research issues from the first chapter of the dissertation. The research philosophy, methodology and instruments were included. The research is founded on the constructivist philosophical worldview because the experiences of the residents as they utilise public transport system are different and unique. The research techniques include, interviews, observations, geographic information systems, survey questionnaire and documentary evidence. The data was captured and coded in MWater and analysed in Excel. It also included the limitations and ethical issues that arose from the study.

Having explained the methodology, this section evaluated the empirical outcomes. The categories or themes used for the study include travel costs, travel time and distance, travel experiences, employment opportunities and the perspectives of the city municipality. The empirical findings were presented in a retrospective way, which is findings from before MyCiTi were developed and findings from after MyCiTi were also developed. Thereafter, a thorough and detailed evaluation and discussion of the results was given. It tied the empirical findings to what literature noted or said and alternative explanations were provided where deviations from literature was noted. That is, the discussion explains how the empirical data relates to literature and the implications of the results on Witsand with regards to the themes.

4.2 Data structuring

This section explains how the data was presented and structured. The first part provided the general information over Witsand, such as the household size, household income and their travel patterns. The information provided input towards explaining the themes and links in the discussion. The second part grouped the findings into five major headings, and these include travel time and distance, travel cost or affordability, travel experience or effort, employment opportunities and city of Cape Town perspectives. These categories were identified in the literature review and as such the research was mainly a pattern matching exercise. In addition, the themes were also shaped or modified from the empirical findings. After the reporting of the empirical findings, a robust debate was provided that relates to the contributions underscored in literature under discussions. Inferences were made to explain discrepancies that occurred between literature and imperial results.

4.3 General findings

4.3.1 Overview of Data Collected

One hundred and five questionnaires were distributed to the residents of Witsand to collect the data as noted in chapter 3.5.3. The questionnaire was used as it enables efficient gathering of data from the sizeable sample of the research. Breaking down the respondents for the study according to their gender, figure 9 shows that 46% were women and 54% were men.

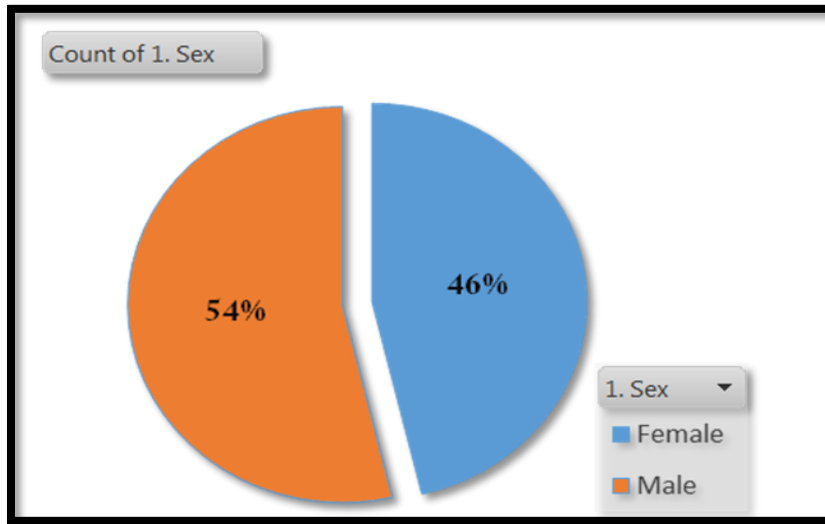


Figure 9: Gender of respondents

Source: Research findings (2022)

The target population was chosen to be the working-class people, ranged in age from 25 to 65, who resided in the area before the BRT was built. This was because they had first-hand knowledge of the research focus in the area. They encountered the transport and mobility issues that were present before MyCiTi was developed and have experienced the services of MyCiTi after it was developed. Rai and Thapa (2015) and Etikan et al. (2016) state that the target respondents of a research should have knowledge of the issues you are addressing in your study to lead to precise results.

From the field research, the most active working population was from the age group 25 to 39 followed by those between 40 to 59 and those above 60, Figure 10.

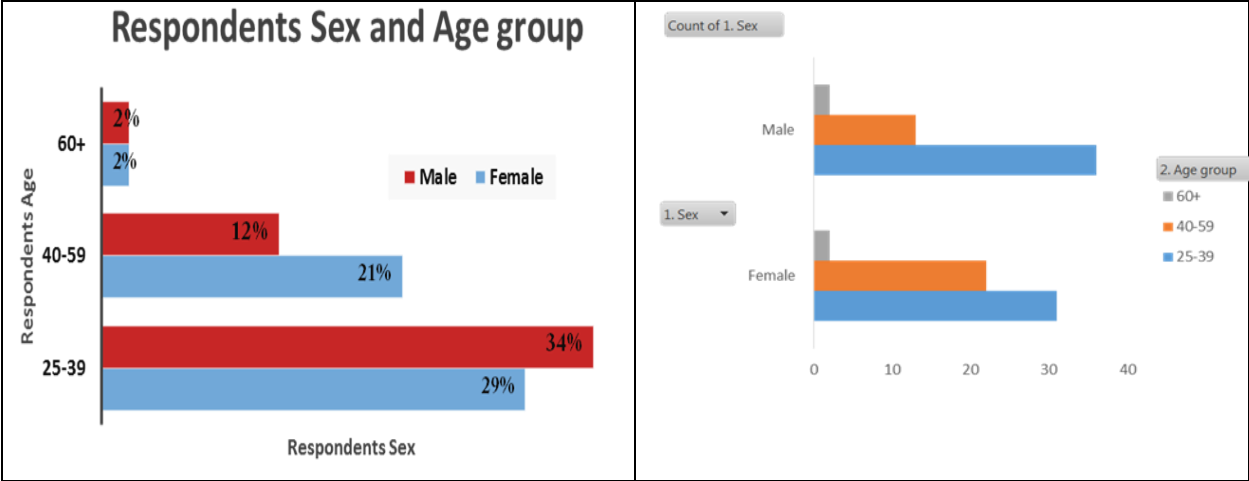


Figure 10: Gender distribution among respondents by age category.

Source: Research findings (2022)

4.3.2 Household size

The study shows that from the respondents, the majority have an average of five people in their households, with the minimum number being two people and the maximum being eight people, (Table 2).

Table 2: Number of People per household

3. How many people are in your household?	
Mean	5
Standard Error	0.148061
Median	5
Mode	4
Range	6
Minimum	2
Maximum	8
Sum	503
Count	105

Source: Research findings (2022)

4.3.3 Average Incomes levels of households

Figure 11 displays the monthly total household earnings. It shows that most of the households earn R5001 and above followed by those earning between R4001 and R5000, then R3001 and R4001.

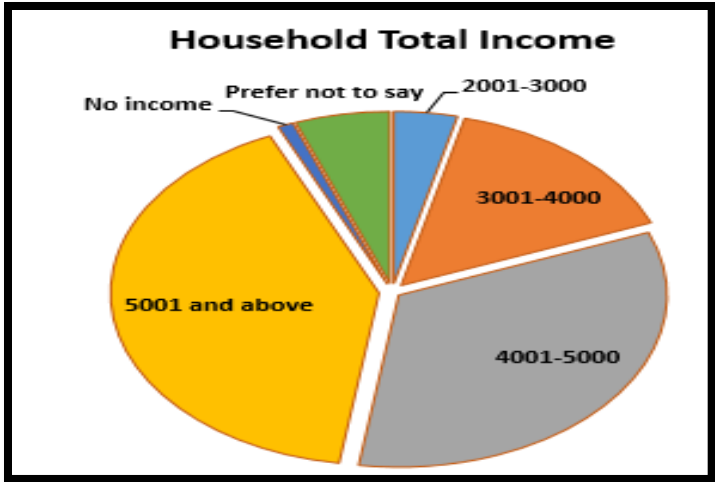


Figure 11: household income per month.

Source: Research findings (2022)

Figure 12 further breaks down the income disaggregated by gender showing for both male and females. The uppermost level of income received for the households is R5 001 and above. Important to note is that a certain proportion of the community earns less than R2 000 as a household, of which the upper bound poverty line per person for South Africa is set at R1227, (Stats SA, 2019).

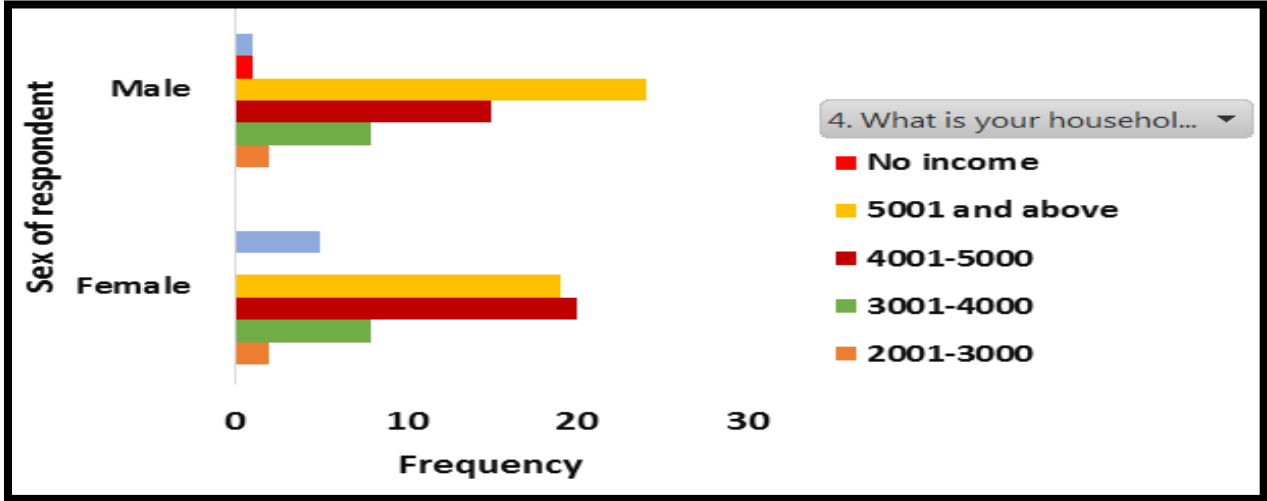


Figure 12: Income disaggregated according to gender.

Source: Research findings (2022)

Observations from the ground show that most of the residents are employed as housecleaners and garden workers for affluent suburbs in Cape Town like Sea point, Camps Bay, Parklands and Melkbosstrand. Another considerable proportion work as waiters and cooks in restaurants located

in Atlantis and Table view. While others are self-employed running their own informal vegetable stalls that sell vegetables to the residents opposite the local neighbourhood shops, Saxonwold known to the locals as 7/11, shown in figure 13. These jobs mostly pay minimum wages starting from 150 a day to 250 or 300 a day depending on the property owner compensating them. Most of the residents stated that, most of their jobs are part time jobs and so they had to secure several jobs to earn enough. Further details on employment areas for the residents of Witsand was covered under section 4.7.



Figure 13: Local employment areas

Source: Observations (2022)

4.3.4 Travel patterns

The travel patterns of the respondents were analyzed in two ways; past travel patterns before MyCiTi was developed and Current travel patterns, after MyCiTi came into effect. Travel patterns show the travel modes used. It also shows in partial view the residents' travel experiences. This

was a partial view because travel experiences were later comprehensively looked at under section 4.6 of this chapter.

4.3.4.1 Current travel patterns

4.3.4.1.1 Travel mode

The current travel habits or patterns of the respondents are examined in this segment. As noted, there are various modes of transport that operate in Witsand namely, MyCiTi, Sibanye and minibus-taxis. Figure 14 shows that most of the respondents use MyCiTi (70%) as the chief method of commuting to their jobs followed by Golden arrow buses (16%) minibus taxis (5%). Figure 15 then breaks down the mode of travel according to gender showing that for MyCiTi both male and females use it equally, while for Sibanye the main users are male. As for minibus taxis it is mostly used by females as most of the female respondents are employed at the local centre in Atlantis. Thus, they use the mode to connect them from Witsand to the shopping malls in Atlantis. The males within the study population walk the most than the females as most are employed in local industries and thus walk to their areas of employment. In terms of private cars, the females are the major users both as drivers and passengers.

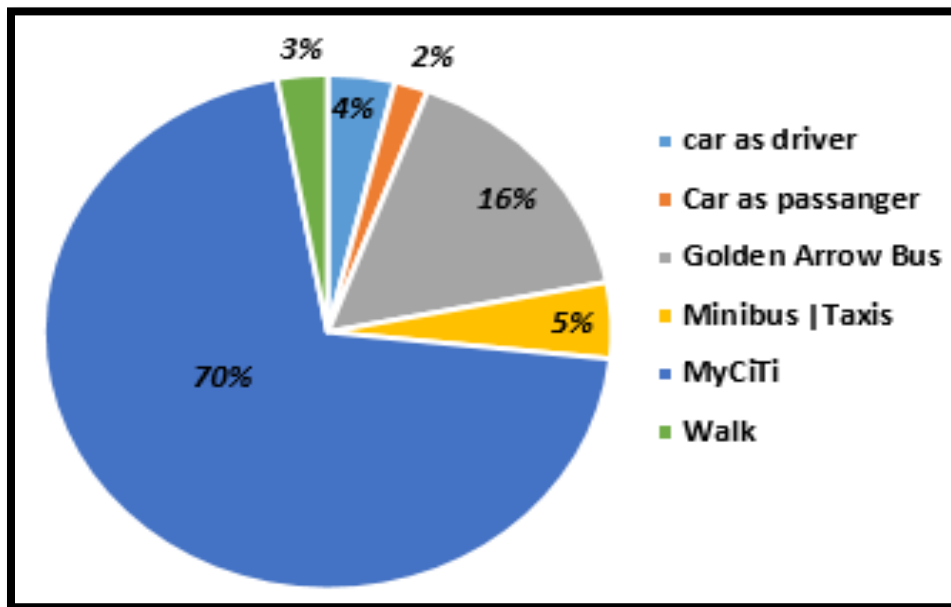


Figure 14: Main Mode of travel

Source: Research findings (2022)

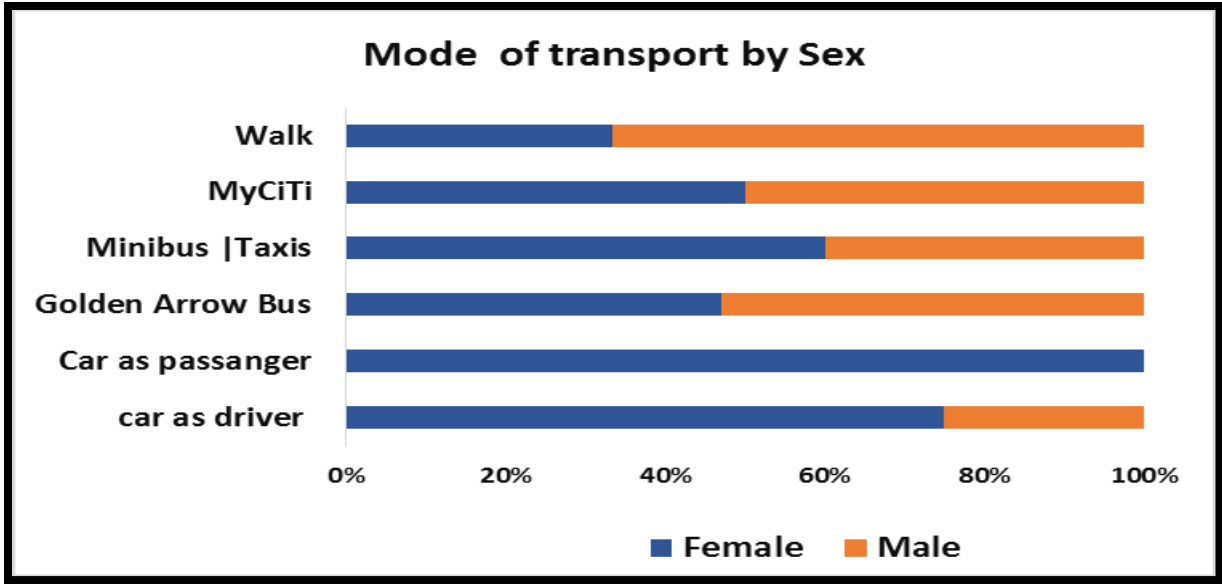


Figure 15: Main mode of travel according to gender

Source: Research findings (2022)

Figure 16 shows the several reasons why people selected their mode of travel as their main choice. The study shows that, for users of MyCiTi, their reason for not using other modes of travel was that other modes are too expensive when compared to MyCiTi. Observations on the ground show that this is true as for example, MyCiTi costs R30, 90 during peak hour, while Sibanye costs R35, 00 for commuting from Witsand to Cape Town CBD paid daily. This as a result enables the transport users to save R4 for each ride.

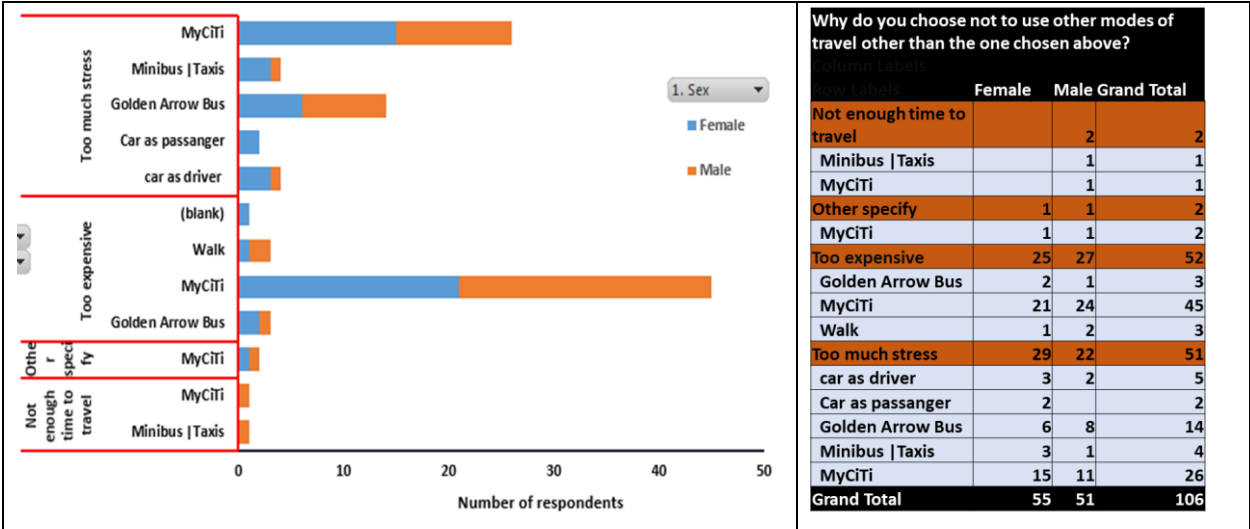


Figure 16: Reasons for not using other modes of travel.

Source: Research findings (2022)

Another reason given by MyCiTi users for not using other modes of transport is that they consider them to cause them too much stress. This is because other modes do not provide routes that links them directly to most of their working places like MyCiTi routes. Some of the residents mentioned that with MyCiTi services can stop near places of their places of employment. With Sibanye and minibus taxis, the respondents are forced to walk extra miles to arrive to their areas of employment.

Respondent A532X3 stated that: *MyCiTi has enabled me to take part time jobs in parklands and table view. It has less hassle than other transport modes as it takes me very close to the houses I will be working in as a housemaid.*

Others highlighted that with MyCiTi interchanging from one MyCiTi bus to another was easier as they would be within the protection of the MyCiTi infrastructure as most of the stations have covers over them and seats thus providing protection from the elements of the weather and comfortable. This is unlike the other modes as they will be exposed, and the interchanges are less organised. For Sibanye users, they argued that using other modes of travel is stressful for them. This is because there are certain routes that MyCiTi does not operate within and as such using it would cause them to interchange during their journey. Others stated that even though Sibanye fares are higher than MyCiTi, that cost is made insignificant due to Sibanye being faster than MyCiTi during off peak hours.

The study shows that most of the residents use more than two modes of travel during their trips to work. Figure 17 shows that 32% of the respondents would walk to their places of work thereafter. Then 25% of the respondents would take Sibanye buses mostly at the CBD, followed by 20% who took MyCiTi and 13% took minibus taxis.

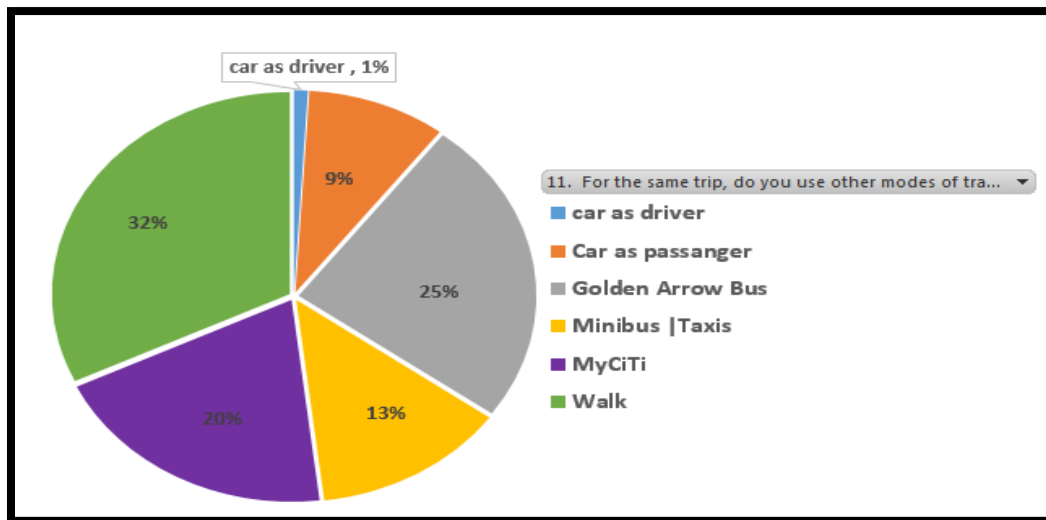


Figure 17: other modes of travel used for the same trip to work.

Source: Research findings (2022)

4.3.4.2 past travel patterns

This section looks at the past travel data of the respondents before MyCiTi came into operation in their area. Figure 18 shows that 58% of the respondents stated that they used to work in the same place they used to work before MyCiTi came into effect. While 42% of the respondents stated that they had changed employment areas over the years.

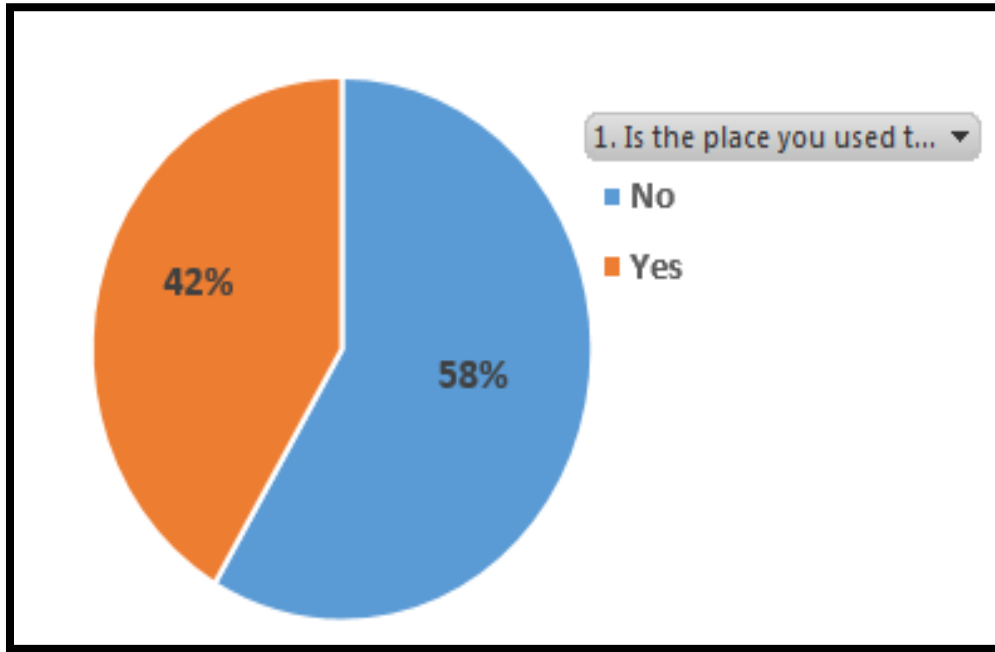


Figure 18: Was the residents' place of work in 2013 the same as their current job?

Source: Research findings (2022)

4.3.4.2.1 Travel mode

For those that stated that they did not change their places of work, Figure 19 shows that most of these residents (37%) used to use minibus taxi as their main mode of travel. Twenty-nine percent stated that golden arrow buses or Sibanye was their main mode of travel followed by 19% that used to walk mainly because of being employed within the local industries.

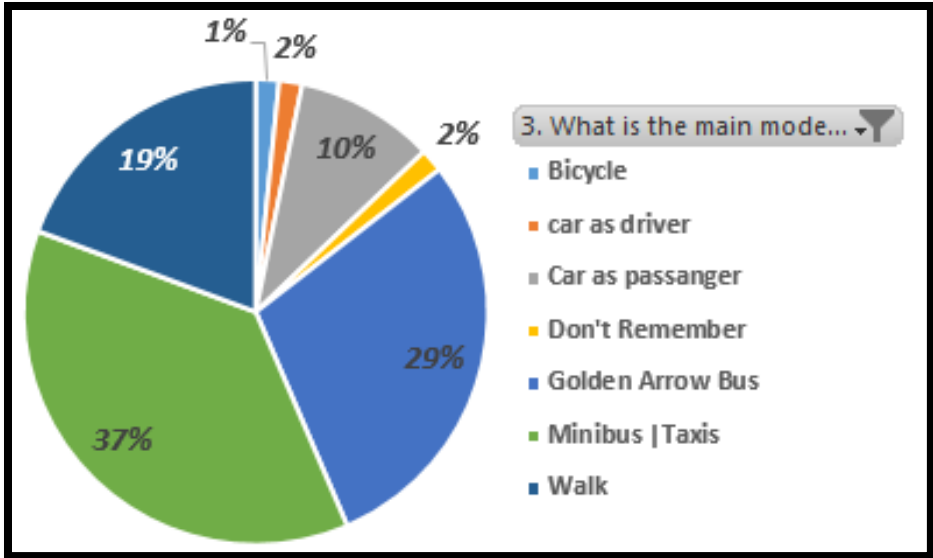


Figure 19: The residents whose did not change their workplace and main mode of transport used.

Source: Research findings (2022)

For those that said, yes to changing workplaces, evidence show that that half of the respondents (50%) used Sibanye as their main mode of travel followed by 33% who used minibus taxis and 12% used cars as passengers and 5% would walk, (figure 20).

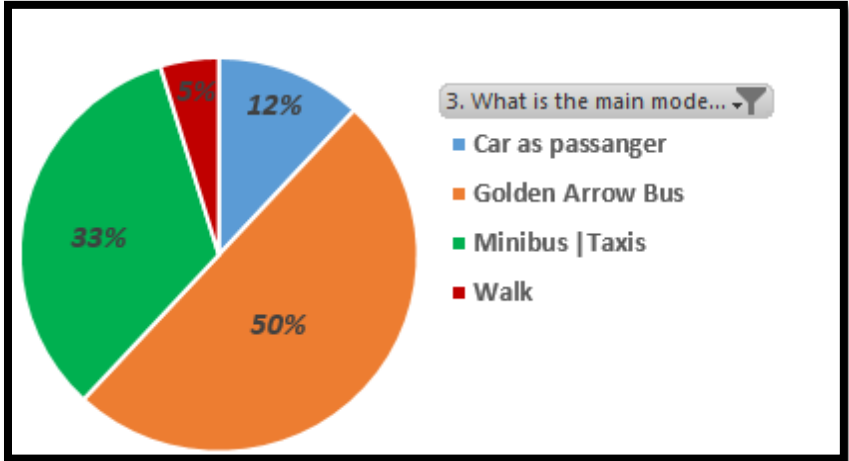


Figure 20: Residents who changed their workplaces and the main mode of transport used.

Source: Research findings (2022)

In terms of interchanging, Figure 21, the respondents show that 55% would change into Sibanye buses followed by 20% who stated that they used cars as passengers as they would hick transport from the main road, R304 highway. This was followed by 11% who used minibus taxis and 7% would walk towards their workplaces.

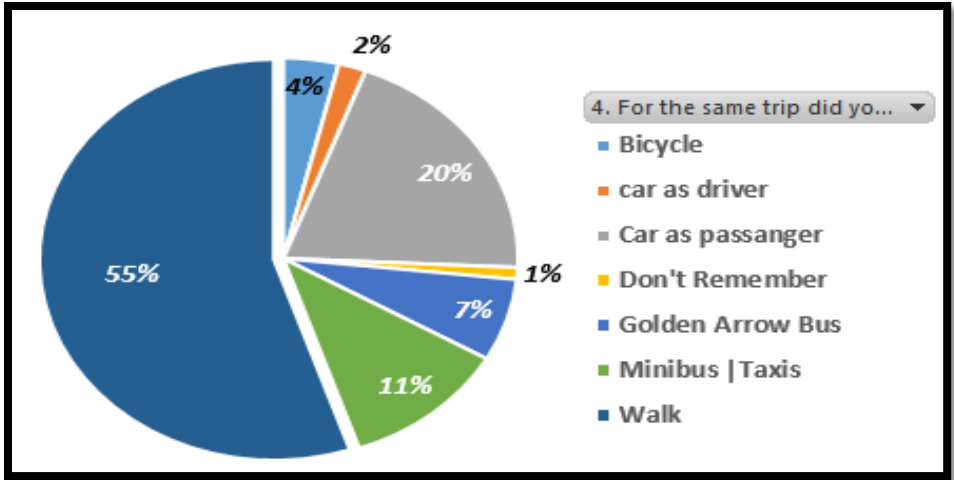


Figure 21: Different modes of transport utilized for the same journey (walking or using a minibus taxi to get to the bus)?

Source: Research findings (2022)

4.4 Travel time and distance

4.4.1 Travel time to work.

Public transportation is accessible if it is provided at a practical and realistic distance and time.

4.4.1.1 Past travel time to work.

The study shows that the average length of trips to work for the residents back in 2013 was 42 minutes (table 3). Thus, for both trips to and from work the total length of the trip was 1 hour 24 minutes that is 82 minutes.

Table 3: Total length of trip to work

5. What the total length of your trip to? (in minutes)	
Mean	41.83894
Standard Error	11.52665
Median	15
Mode	1

Source: Research findings (2022)

4.4.1.2 Current travel time to work.

The findings shows that majority of the respondents (32%) spend more than 1 hour to 1 hour 30 minutes for their whole trip to work (Figure 22). This is followed by 30% who said their journeys took 41 minutes to 1 hour and 17% said it took them 31 to 40 minutes and 8% taking more than 2 hours. This shows that for both combined trips to and from work, they spend more than 2 hours of their time traveling. The implications of these findings were discussed under the discussion section in 4.9.

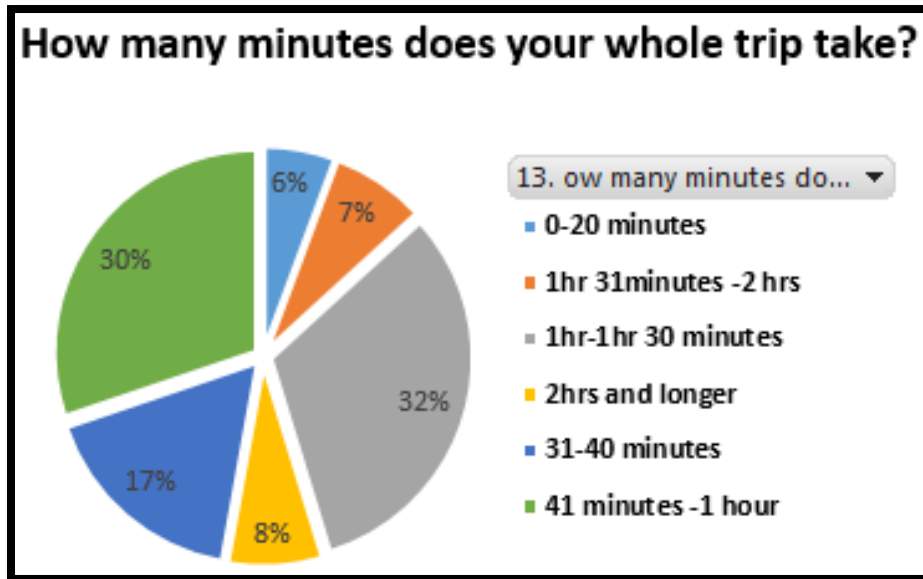


Figure 22: travel time for a whole trip to work

Source: Research findings (2022)

The findings reveal that many respondents were forced to decline job offers since they had long distances to commute, as noted in Figure 23. Further discussions with the respondents showed that most had to lie about their home address to apply for jobs. One of the respondents noted having to use his friends address in Table View and another Joe Slovo instead of their Witsand addresses to increase their chances of getting the job as the employers preferred applicants who live within the neighbourhoods closer to the area of employment.

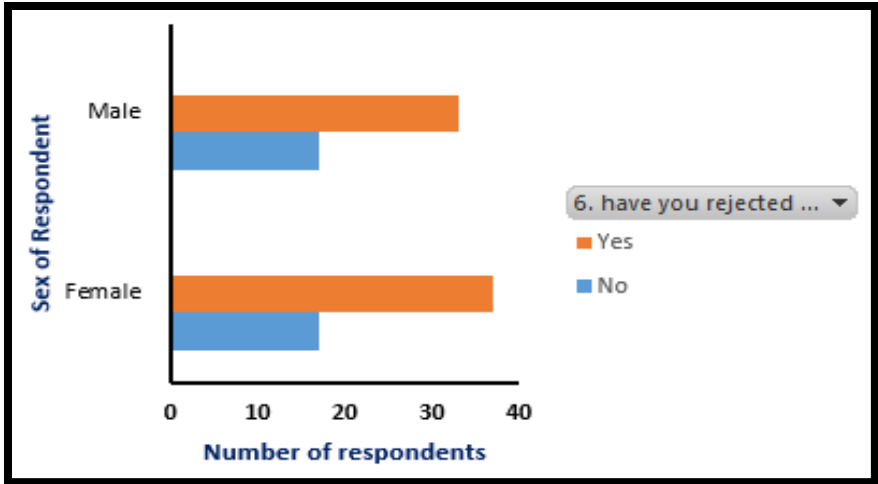


Figure 23: rejections of job offer because of long distance of travel.

Source: Research findings (2022)

4.4.2 Travel time and walking distance

From the findings (figure 24) those who take 0 to 10 minutes to reach their travel mode, are mostly minibus taxi users (22%) due to the flexibility of the minibus taxi, the travel mode can pick up the residents from their doorsteps. In addition, the minibus taxi rank is located centrally in Witsand and is easily accessible to all residents and they can walk there within limited time. However, for the residents of Witsand the average walking distance for most of the respondents (53%) is between 11 to 15 minutes, as shown in figure 24. This is because from the observations it was noted that MyCiTi buses do not operate within the community. The study area is roughly 1, 3 kilometres away from the first bus stop, which is situated near the industrial zone.

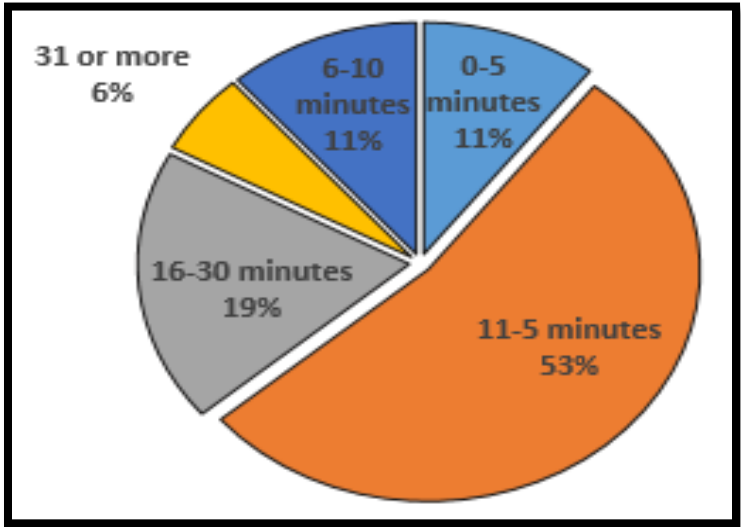


Figure 24: walking distance to the nearest minibus taxi/bus/train stop

Source: Research findings (2022)

The researcher noted that most of the residents started to walk from 5 o'clock to past five in the morning to wait for the first bus to arrive. Others mentioned that they had to run in the morning to get to the MyCiTi bus stop on time. There are 3 MyCiTi bus stops located outside of Witsand that are used by the residents and figure 25 shows the three operational bus stops that are used by the residents. The first bus stop is called Harry Alexander, it is located 1.3 km from Witsand and depending on the pace of the residents, and they can take about 10 to 15 minutes walking at a faster pace. Those who use this bus stop must take a bus that takes them to Atlantis main centre where they would have to interchange to the buses that would take them to their areas of employment.

The second bus stop is called John Dreyer and is located 1.55km and like the first bus stop, residents are taken to Atlantis centre to interchange. The third last bus stop is called Charel Uys South Drive located by the main road near West Coast College located about 2.19 km from the study area. Those who use it walk for more than 30 minutes (about 19 % of the respondents) to reach this stop from Witsand. The bus stop gives them access to buses that go straight to Century city or Table View instead of interchanging at Atlantis Centre, however delays are encountered when this route as buses must take a detour through Melkbosstrand.



Harry Alexander – First bus stop located near the local industries.



John Dreyer – Second bus stop located near Atlantis industrial and WEET – BIX Atlantis brunch.



Charel Uys South – Third bus stop located along the main road next to West Coast College.

Figure 25: MyCiTi bus stops located outside of Witsand.

Source: Research observations

Most of the respondents noted the need for MyCiTi to start operating within their community, noted below. This would reduce the distance they must walk to reach the first MyCiTi stop highlighted above. This shows that walking longer distances can be a discouraging factor for residents to travel as reflected by some of the responses.

Respondent A54YAT stated that “My city must start from Witsand not far away in the industries”.

Respondent A52X85 stated that “MyCiTi must locate closer in our Neighbourhood rather than for us to walk 30 min to get to the first station”.

Walking distance for Sibanye and minibus taxis from their homes are shorter ranging from 0 to 10 minutes depending on how far they are located from their bus stop. Sibanye has two bus stops within Witsand all within 10 minutes’ walk from the furthest house. Table 4 provides the walking time towards the closest public transportation terminal by age and gender. Thus, many of the respondents from all age groups tend to walk 11 to 15 minutes to their respective public transport stops. Surprisingly, females from the age group, 25 to 39 and 40 to 59 tend to walk longer distances than the male respondents that is between 16 – 30 minutes.

Table 4: Walking distance to nearest public transport mode stop.

Count of 9. How many minutes does it take from your house to your taxi/bus/train stop?						
Sex/Age disaggregate	0-5 minutes	11-5 minutes	16-30 minutes	31 or more	6-10 minutes	Grand Total
25-39	5	40	13	3	5	66
Female	1	19	7	1	2	30
Male	4	21	6	2	3	36
40-59	6	13	6	3	7	35
Female	6	6	6	2	2	22
Male		7		1	5	13
60+		3	1			4
Female		2				2
Male		1	1			2
Grand Total	11	56	20	6	12	105

Source: Research findings (2022)

4.4.3 Travel time and Interchanges

A critical issue that affects travel time are the interchanges that the respondents face along their journey to work. Figure 26 shows that most of the residents (54%) spend 0-10 minutes while waiting for the next transport mode, which is reasonable. However, 24% of the respondents stated that they spent between 10 and 20 minutes, which further increases their travel time, while 22% said they spent more than 21 minutes to more than 41 minutes waiting for the interchange mode of travel. This is especially worse for Sibanye buses that take 1-hour intervals for some of their trips as noted from observations and from the responses of the respondents. Important to note is that during off-peak periods the amount of time that travellers must wait to interchange increases as they experience less patronage than during peak hours.

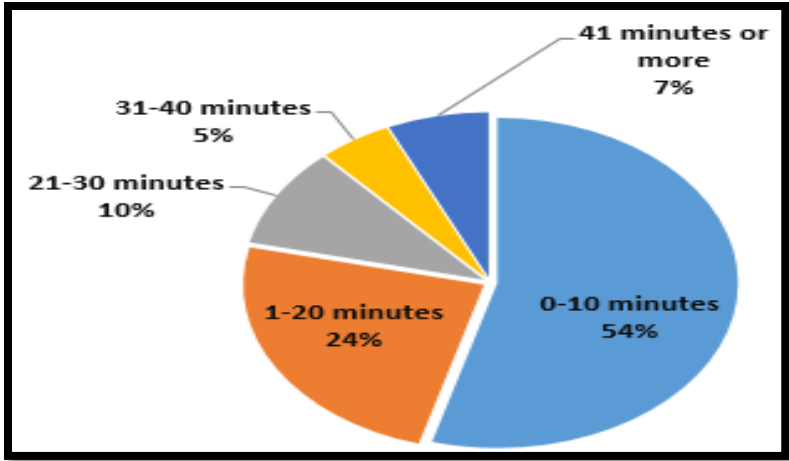


Figure 26: waiting time for second mode of travel during an interchange.

Source: Research findings (2022)

4.4.4 Travel time from the residents` perspective

This part of the research compares the impact of the BRT on accessing employment areas for the residents of Witsand before and after MyCiTi came into operation in terms of travel time. The respondents were asked if there were any changes in travel time after they started using the system, Figure 27 shows that 39% of the respondents did not see any change, while 35% said it increased and 26% said it was reduced.

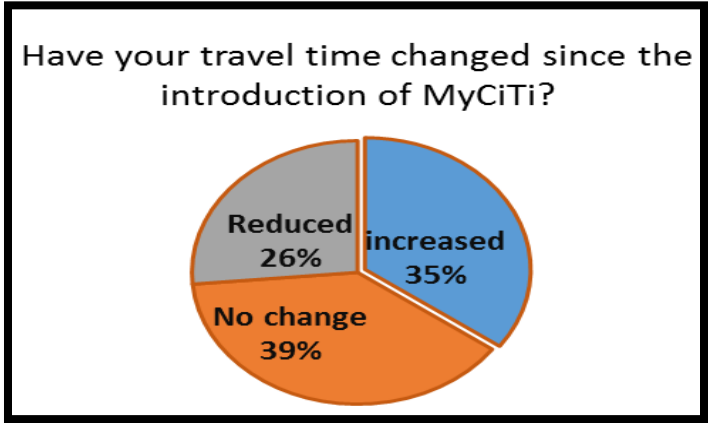


Figure 27: changes in travel time

Source: Research findings (2022)

4.5 Travel cost or Affordability

For the study certain conditions were considered while calculating and comparing the cost of travel in Cape Town for various means of transportation from the study area and these include.

1. For the research, only current travel costs were used. Past travel costs prior to the development of MyCiTi were not used because most responders could not remember the actual costs and hence, they would be less accurate.
2. The travel costs that were used for the study were for trips that originate in Witsand, and Cape Town civic centre as the destination. Due to the limited timeframe of the study and limited resources, the calculation for trips was limited to this route. Thus, the travel costs did not include trips to other areas of employment.

4.5.1 MyCiTi costs

For payment of transportation fares, MyCiTi uses a card system in which users load money into the Myconnect Card, which is then used to tap in and out of the system (Transport for Cape Town, 2017). If there is money or points on the card, it can be used anywhere in the system. The fare system is separated into two parts: the peak and off-peak fares, with the former having higher fares because it is when most passengers use the system, and the latter having lower fares because the system will be used by less people.

The cost of travel is determined by travel distance of the commuters; therefore, the cost of traveling increases with increasing distance. Those who use the card with less points face a penalty that must be paid when the card is loaded again for usage. Table 5 shows the fare charges of MyCiTi from first of July 2021 to date:

Table 5: MyCiTi fares 2021/22

Distance Band	Peak Fare	Off-peak fare	Journey route
40-50km	R28.30	R22.90	Atlantis – Century City
50-60km	R30.90	R25.70	Atlantis – Adderley (Civic centre/CBD)
60km+	R33.50	R28.30	Hout Bay – Atlantis

Author`s own creation (2022)

Thus, assuming the trip will be from Atlantis to the Civic Centre, for a household head, their travel expenditure would be shown in Table 6:

Table 6: Daily and Monthly transport cost of MyCiTi for an individual:

	Peak fares	Off-Peak fares
Daily basis	R61.8	R51.4
Monthly basis	R1 915,8	R1 593.4

Author`s own creation (2022)

4.5.2 Sibanye costs

Sibanye or Golden Arrow buses accept two alternative forms of payment. The first is to buy weekly or monthly tickets, which are then loaded into their golden arrow gold cards. The distinction between MyCiTi and Sibanye cards is that Sibanye cards are route specific. Thus, if a weekly ticket from Atlantis to Civic Centre is purchased, the card can only be used on that route and not on other routes such as Civic Centre to Khayelitsha. The second method of payment is when a passenger boards the bus and pays cash to the driver, who then gives them a ticket that is valid for that journey and time. The fares are also charged according to peak hour and off-peak and are broken downs in table 7 and 8:

Table 7: Sibanye fares 2021/22

Route	Peak fare	Off-Peak fare
Atlantis to Civic centre/CBD	R35.00	R20.50

Author`s own creation (2022)

Table 8: Daily and Monthly transport cost of Sibanye for an individual:

	Peak fares	Off-Peak fares
Daily basis	R70.00	R41.00
Monthly basis	R2 170.00	R1 271.00

Author`s own creation (2022)

4.5.3 Mini-bus taxis costs

Charges or fares on minibuses are based on demand, and passengers pay directly to the driver when they board the minibus taxi. The minibus taxis charge a fixed rate all day and are organized as in table 9 and 10:

Table 9: Mini-bus taxi fares 2021/22

Route	Peak fares	Off-Peak fares
Atlantis to Civic centre/CBD	R40.00	R30.00

Author`s own creation (2022)

Table 10: Daily and Monthly transport cost of Mini-bus taxis for an individual:

	Peak fares	Off-Peak fares
Daily basis	R80.00	R60.00
Monthly basis	R2 480	R1 550

Author`s own creation (2022)

4.5.4 Monthly transport costs per mode

Figure 28 shows the monthly transport costs for the different public transport modes operating in the area. It shows that during the peak hour MyCiTi is the cheapest of all the available modes of travel compared to other public modes of travel in the area. It is cheaper than Sibanye by a difference of R254.2 per month and it is cheaper than the minibus taxi by R564.2. However, during off peak time Sibanye is the cheapest mode of travel. It is cheaper than MyCiTi by R322.4 and then minibus taxi by R589. Thus, travelling during peak periods using MyCiTi is more affordable, while during off peak period using Sibanye is more cost effective.

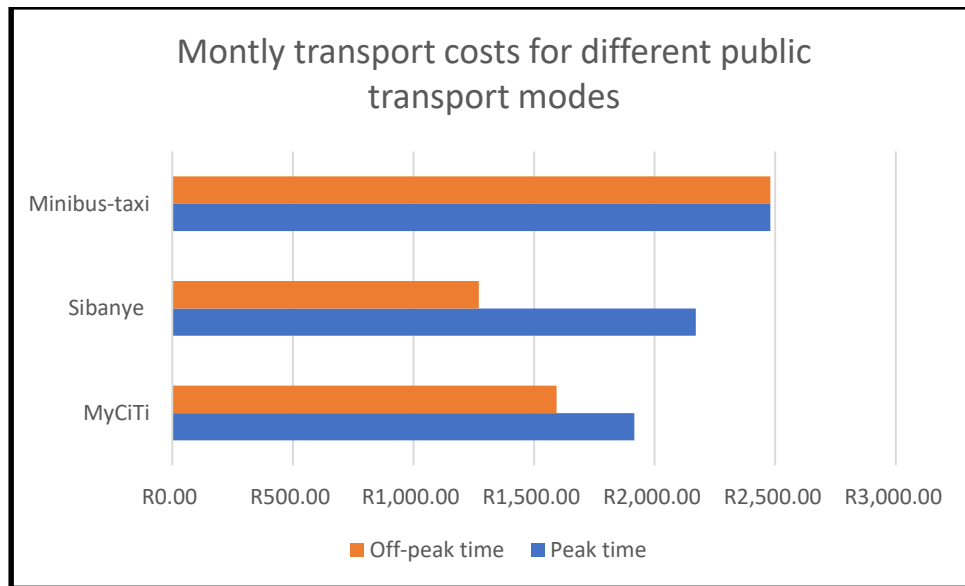


Figure 28: Monthly transport costs per mode

Source: Research findings (2022)

The research findings show that purchasing monthly tickets for Sibanye and MyCiTi is more affordable than paying for transportation daily. Important to note is that MyCiTi monthly tickets are unlimited. That is, they can be used for any journey and run over the weekends as well, given they fall within the month. However, Sibanye monthly tickets are limited in that, they are strictly for 30 journeys and are limited to a specific route. That is, if the monthly ticket is for the route Atlantis to Cape Town civic centre, then it can only be used for that route and cannot be used for other routes.

Another important factor noted from the research is that MyCiTi tickets are cheaper if they are bought on a monthly basis. Monthly tickets cost R790 whereas those who upload their tickets and use them daily cost R1 125.8. Thus, monthly tickets are cheaper by R335.8. And for Sibanye buses, their monthly tickets cost R1 224 making it cheaper than buying daily tickets at R2 170 by R 946. Thus, comparing between the Sibanye and minibus taxis, MyCiTi is a cheaper public transport option. Respondent A53H87 noted that:

“They are more affordable if you buy the monthly ticket.”

4.5.5 Travel Costs from the residents’ perspective

Travel costs, after MyCiTi came into operation were placed on a worst and best scale (Figure 29) for the residents to weight. This was done to compare the before and after the implementation of MyCiTi. In terms of travel costs or affordability 49.5% of the respondents stated that it was better and 42.9% noted that it was much better and 7.5% said there was no change. This shows there are positive reviews of MyCiTi being affordable.

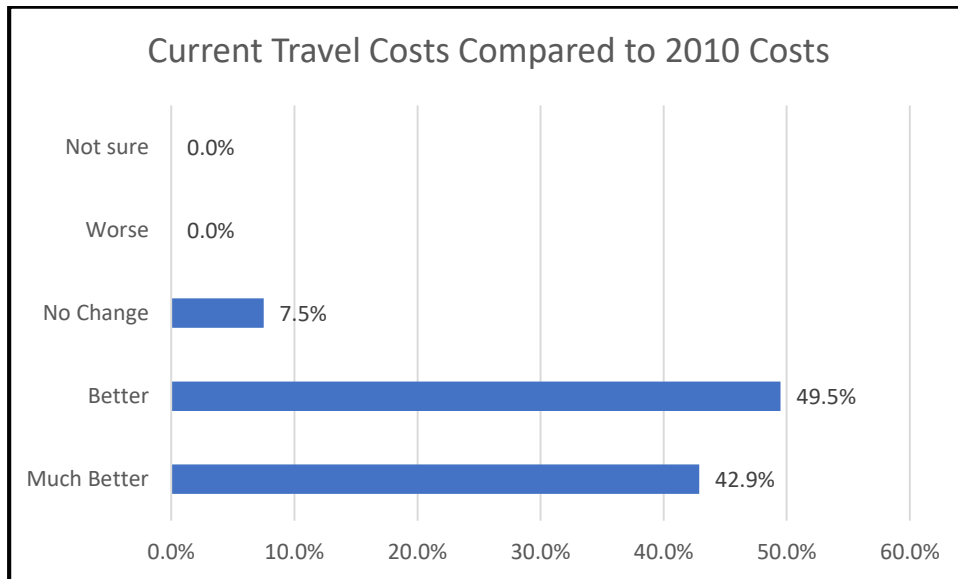


Figure 29: Current travel costs compared to 2010 travel costs.

Source: Research findings (2022)

When requested to offer the reasons for their responses to figure 28 on the worst best scale. Most of the respondents noted that travel costs or affordability was the most critical issue they valued about MyCiTi over other modes of transport. They noted that MyCiTi’s pricing was affordable, and it enabled them to work in areas they could not work prior to the development of the BRT service. Others argued that when equated to Sibanye and minibus taxis, MyCiTi was cheaper especially during peak hours or if bought monthly. Some argued that this enabled them to make significant savings which they cannot do with other modes of transport. The cheaper off-peak pricing of MyCiTi also enabled the residents to travel whenever they wanted.

Respondent A53274 stated that "They (MyCiTi) is way better than other modes of transport like Sibanye and taxis that are very expensive during peak periods."

However, not everyone saw MyCiTi as an affordable option because some of the respondents cited that MyCiTi was costly if the costs were reflected from a household level. They argued that if the BRT costs included the mother, the father, and the children then the BRT monthly costs would be

higher. Others noted that they were paid on a weekly basis and were not able to purchase monthly MyCiTi fares that are cheaper. Thus, they are forced to purchase daily tickets that are more costly. Other respondents who are unemployed but work on part time basis when they find jobs argued that the MyCiTi tickets were expensive for them as they were still job searching.

4.6 Travel experience

Accessibility should also take into consideration the level of service the BRT provides to the public. Figure 30 shows that to the respondents' safety and dependability are not critical issues when selecting a choice of mode of travel. To the residents the main factor that influences their choice of mode of travel is travel cost. The other issues they consider important include security from crime (safety) and reliability of the mode of travel.

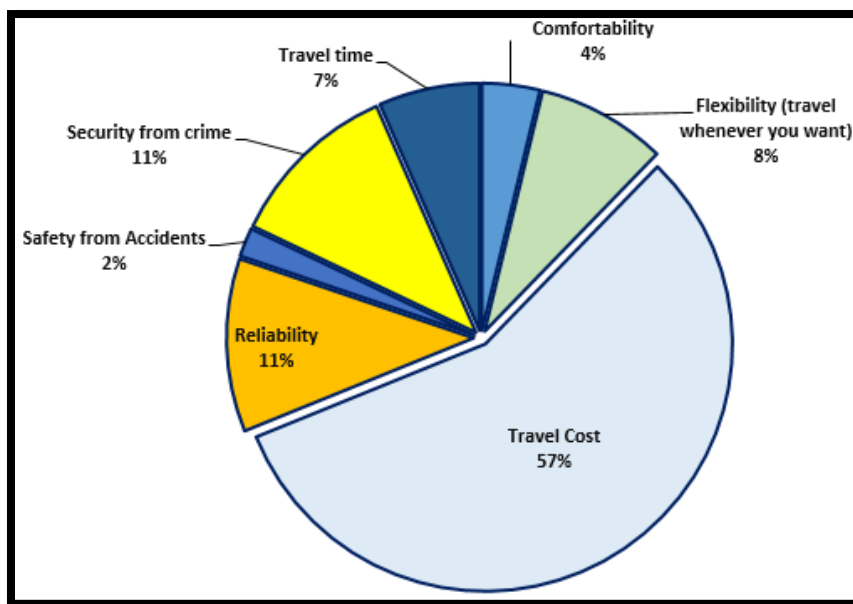


Figure 30: Factors that influences the mode of travel.

Source: Research findings (2022)

A further breakdown of why the respondents prefer MyCiTi to other modes broken down in terms of gender (Figure 31), shows that both males and females equally value affordable (cheaper) MyCiTi over other aspects of MyCiTi. In terms of safety and reliability of the system in both cases the male valued more of safety and reliability than women. Both genders valued improved flexibility equally, however the female respondents valued the system to have more comfortability and making their trips shorter than men.

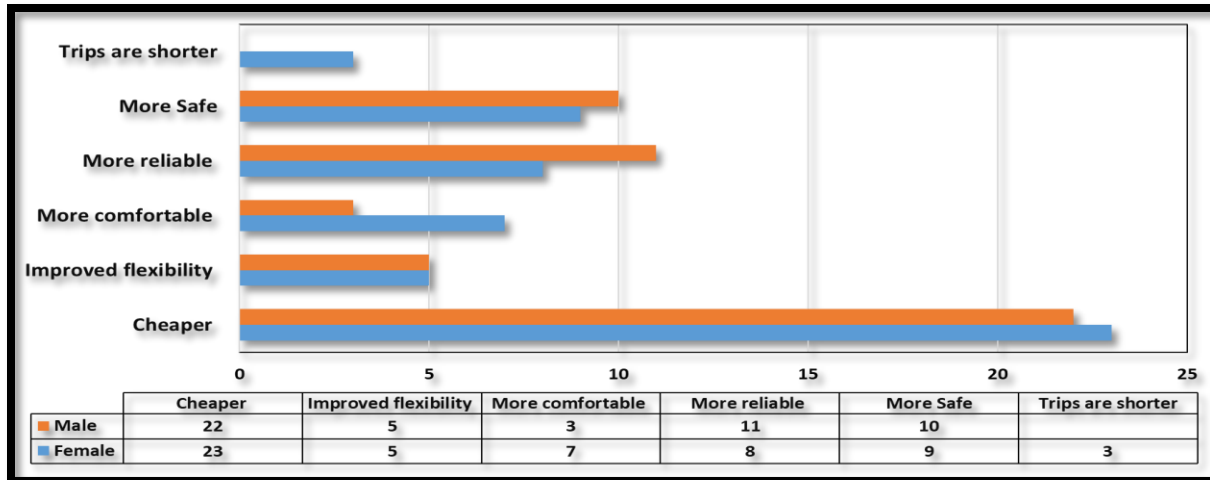


Figure 31: How the respondents travels have altered based on their gender since they began using MyCiTi.

Source: Research findings (2022)

4.6.1 Reliability and information

In terms of reliability, the respondents noted that MyCiTi provided reliable services. They noted that the buses ran on time schedules that were precise enabling them to schedule their schedules proficiently. They argue that the buses are always on time and are run by professional drivers. This has enabled the residents with several jobs to efficiently plan their work schedule with flexibility. In addition, the BRT system has an efficient information system that enables the residents to check the bus schedule and plan their journeys accordingly. Also, the bus stations are furnished with information desks that provide diverse routes for the commuters thus improving their accessibility to different job opportunities.

4.6.2 Safety

The respondents stated that the BRT services are much safer than other modes of travel. They argue that the bus stations are equipped with security cameras and patrons who provide security while waiting at the stations. The stations are sheltered thus providing a roof which is protection from weather elements and exposure to public theft. However, some of the residents have cited several muggings in the area when the residents use the route to access the BRT system. Figure 32 shows that the route they use to reach the BRT bus stops is next to the main arterial road and near a forest. Over the years the residents have done protests to city of Cape Town authorities requesting better service delivery and one of those services are the need for streetlights as shown in appendix 9.



Figure 32: Walkway from Witsand Settlement to MyCiTi Bus Stops

Source: Observations (2022)

4.7 Employment opportunities

This section looks at the employment opportunities available to the residents of Witsand before and after MyCiTi came into effect. This will show if there has been any spatial growth in employment opportunities made available to the residents and as show any improvements in accessibility thereof.

4.7.1 Employment opportunities before MyCiTi came into operation.

Figure 33 shows the spatial distribution of employment areas that are travelled by the respondents before MyCiTi came into operation in their area. From the study it was noted that most of the respondents are employed in the following areas:

- Atlantis centre
- Atlantis industrial
- Witsand
- Melkbosstrand
- Dunoon
- Parklands
- Table View

Most of the residents in Witsand used to work locally particularly in Witsand, Atlantis centre and Atlantis industrial areas. Most noted that that, they were forced to seek local employment to reduce the high transport costs they would incur by travelling far away from their homes. Respondent A533GU stated that:

MyCiTi has increased a lot of opportunities in my area. Before MyCiTi, I only worked at the industrial areas here or at Atlantis centre.

A53VHD stated that: I used to work in local jobs prior the development of MyCiTi because the transport costs were too much, but MyCiTi is more affordable, and I can now take jobs in west beach because of flexible transport.

Melkbosstrand, Du noon, Parklands and Table View were also the areas that most of the respondents went for employment due to their proximity from the study area. They are located at approximately 21.5km, 31.3km, 34, 1 and 33.5km from Witsand. Comments of the respondents during observations show that most were employed in jobs with low level of skills required such as cleaners in shopping malls, being waiters and servers in restaurants and being house cleaners in the affluent suburbs.

Nevertheless, there are anomalies in the study who choose to commute faraway jobs and these areas include Camps Bay, Cape Town airport and Philippi that are located approximately, 56.8km, 50.8km and 57,7 km from Witsand.

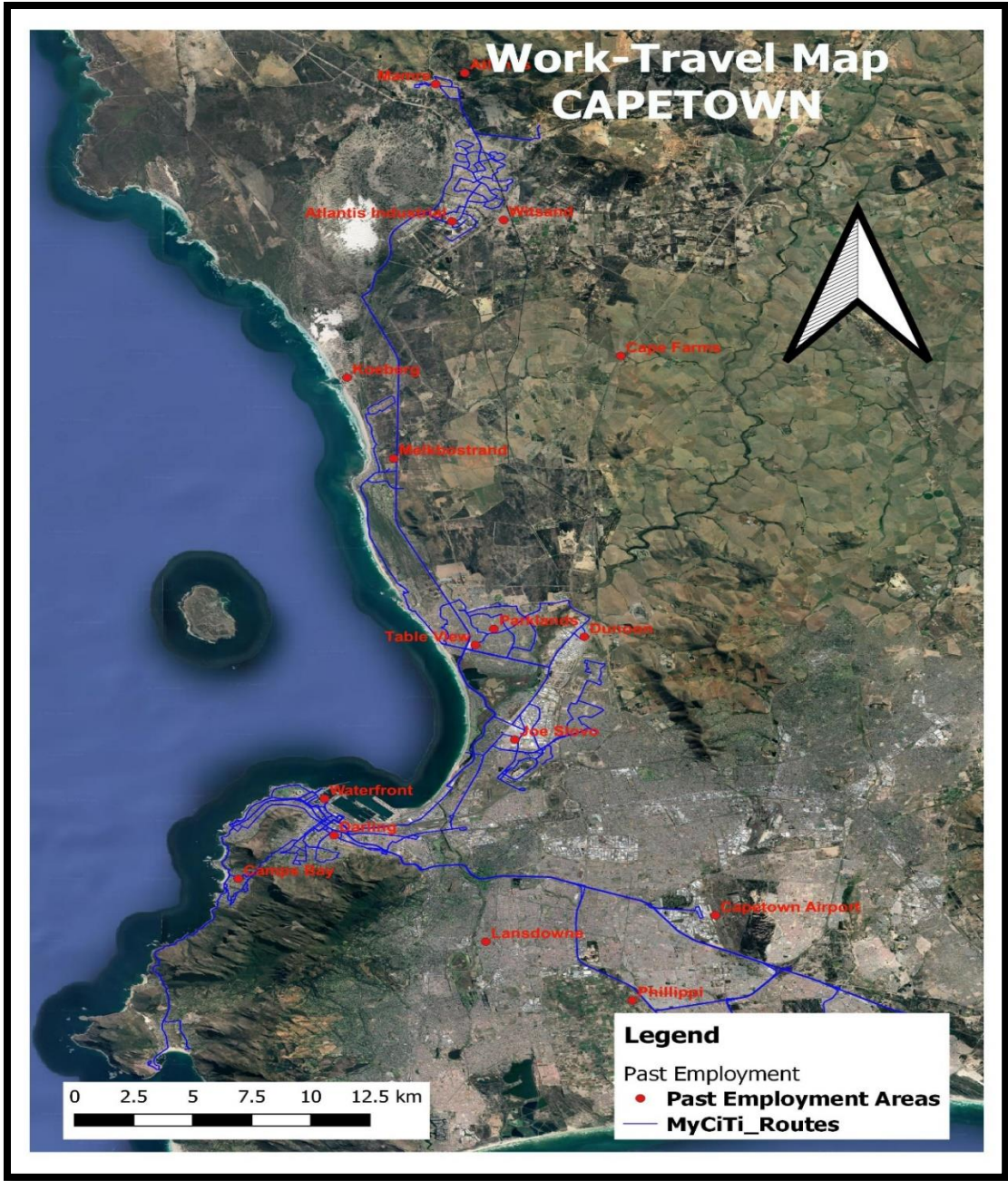


Figure 33: Spatial distribution of employment areas before MyCiTi commenced in Witsand.

Source: GIS map developed by the researcher (2022).

4.7.2 Employment opportunities after MyCiTi came into operation.

Figure 34 shows the spatial distribution of employment areas that are travelled by the respondents after MyCiTi came into operation in their area. From the study it was noted that most of the respondents are employed in the following areas:

- Cape Town
- Atlantis
- Century City
- Melkbosstrand
- Milnerton
- Parklands
- Table view
- Rondebosch

The spatial distribution of areas of employment has increased for the residents of Witsand. Most respondents work in Cape Town civic centre, the primary economic and trade centre of Cape Town. This is followed by Atlantis showing that local employment is still key towards creating job opportunities. Sub-regional economic hubs of Cape Town such as Century city and Table view act as significant areas of employment. Areas such as Melkbosstrand, Milnerton, Parklands and Table view are magnets to residents of Witsand as they are located within reasonable distance approximately 21.5km, 36.6km, 34.1 and 33.5km, respectively.

The study also shows that the areas of employment for the respondents has increased from prior the development of MyCiTi as some of the respondents travel to places such as Hout Bay, Constantia, Brackenfell that are located far from Witsand. For example, Hout Bay is located more than 65km from Witsand and takes approximately 3 hours to travel to arrive at place of employment. Comments during the field research from the respondents revealed that MyCiTi has reliable timetable bus schedules that made it easier for them to plan their journeys more accurately and efficiently. Respondent A552WS stated that:

The schedule timetable is reliable making it to plan my time efficiently.

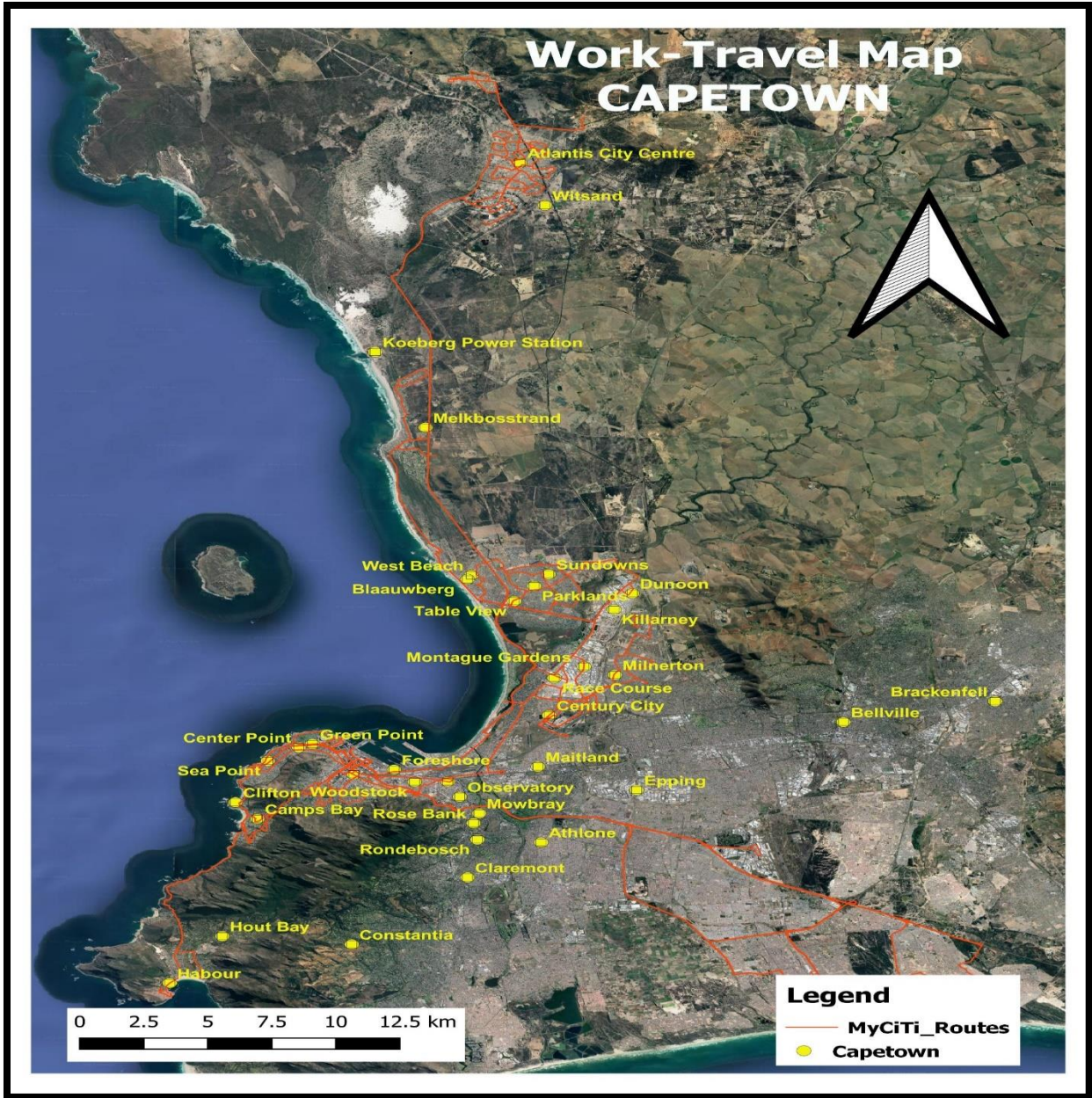


Figure 34: Spatial distribution of employment areas after MyCiTi commenced in Witsand.

Source: GIS map developed by the researcher (2022).

4.7.3 Employment opportunities from the residents` perspective

The respondents were then asked to rate how MyCiTi has improved their access to employment. Figure 35 shows that 37% of the respondents stated that MyCiTi has opened moderate opportunities for them. While 26% said that it opened many opportunities for them, 20% stated that the system has not opened any opportunities for them and 14% stated that the BRT system has potential to open opportunities.

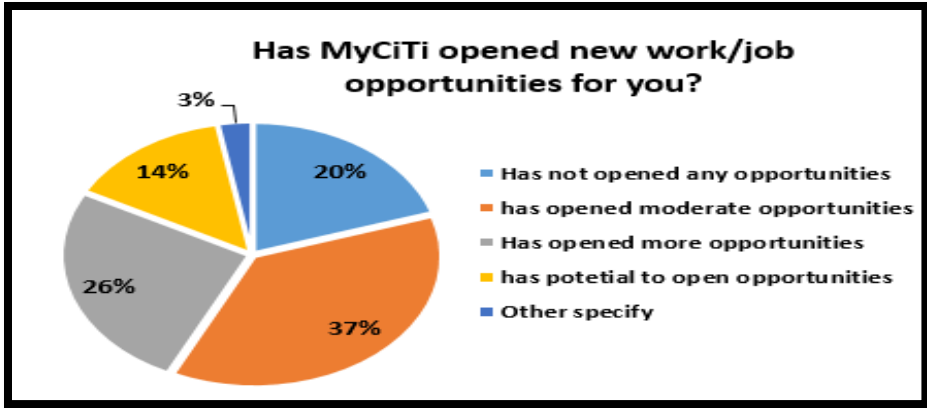


Figure 35: How MyCiTi has opened new work or job opportunities to the respondents.

Source: Research findings (2022)

When asked to what extent MyCiTi has enabled them to access job opportunities that were far away such as the CBD or beyond (Figure 36), more than 50% of the respondents said the BRT did to a greater extent especially for the male respondents but equally the same for the female respondents. However, about 25% of the respondents especially the female noted that the BRT increased their access to employment to a lesser extent. The remaining stated that there has not been any change from before MyCiTi came into effect.

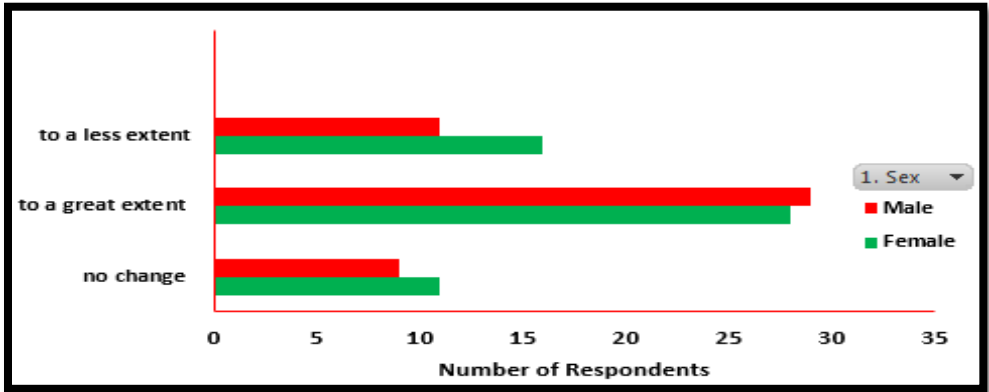


Figure 36: To what extent MyCiTi has enabled access to job opportunities that were far, such as the Cape Town CBD or beyond for the respondents?

Source: Research findings (2022)

When asked to provide comments on their reasons for selecting their responses in Figure 36, most of the respondents were of the view that MyCiTi enhanced their accessibility to employment areas, by broadening their job search area enabling them to be employed in their current jobs. They claimed that MyCiTi made it easier to move around looking for jobs and reduced the fear of being robbed while in transit.

Respondent A54ZEG stated that “Before I found a job I am in now, I used to travel 3 to 4 days a week to parklands and Melkbosstrand to look for a job using MyCiTi and eventually it paid off.”

Some of the residents were of the view that MyCiTi has provided them with an affordable public transport mode while searching for employment. Most of the residents stated that there is a place in Melkbosstrand called ‘the point’ that allows unemployed residents to seek employment. The residents stand at the place and wait for affluent residents of Melkbosstrand to select the people they want to work in their homes. The respondents are normally given jobs to landscape the gardens or clean the houses. If done diligently, the jobs are upgraded into permanent jobs. The residents stated that there are times when one is not selected for a job when they go to the point in search for work. It is on such times that MyCiTi is affordable in that when they are not selected the burden of lost transport costs is less as compared to using Sibanye or minibus taxis.

In addition, MyCiTi has increased the scope of areas that the residents can look for work. Some of the residents argued that prior to the development of MyCiTi, they limited their job perspectives to local jobs or those near Witsand. This was mainly due to avoiding travelling long distances and paying high transport costs. Thus, the finding suggests that the BRT has provided direct transport routes to areas they previously had to interconnect to or were too far away to travel. These areas include Sea point and Waterfront.

Respondent A53P3H stated that “I fix and paint furniture, with MyCiTi I can now travel to many places like Hout Bay and my business has improved”.

While other respondents argued that the BRT has improved their access to employment opportunities by bringing them directly to their areas of employment. They argue that it has brought them to the doorstep of their employers especially those who work in Parklands and Melkbosstrand.

However, not everyone is of the view that MyCiTi has improved their accessibility to employment opportunities. Some of the respondents noted that that the system has not brought about any changes to them, since Witsand is located far away from jobs that pay better.

4.8 City of Cape Town perspectives

Several representatives from the municipality of Cape Town were interviewed. This segment looked at the views of the city authorities on accessibility issues in Witsand.

4.8.1 Development of MyCiTi

MyCiTi BRT services for Witsand were established under the phase 1 state which was based on providing public transport for the Northern corridor. Important to note is that the MyCiTi services that run from Atlantis are the ones servicing the study area in Witsand due to challenges that aroused in the development (addressed under challenges 12.2.1. The area according to the authorities had been identified to be poorly connected to public transport services, having no train

services connecting to the areas such as Atlantis, Mamre and Dunoon, who were low-income areas. They noted that the low-income residents that did not own any cars were captive to the fare charges that minibus taxis would charge and were high for them. In addition, the number of minibus taxis running the area were fewer and was easier to connect the associations and negotiate for the World cup that South Africa was hosting in 2010. Northern areas were identified as high growth areas and thus MyCiTi was developed to increase public transport services in the corridor and connect the areas more easily to the CBD.

Reduced traffic congestion along the corridor was another factor considered in the BRT's development. The corridor had more car users emanating from areas such as Parklands, Table View and Blouberg. Thus, the BRT would act as a mechanism to get the people from their cars by making the BRT attractive because of its speed and thus reduce congestion and increase travel speed. Another key factor was that the Northern corridor had a road reserve that gave room for MyCiTi to be developed.

According to the authorities prior to the development of the BRT, research was done to ensure its success. For example, they conducted a trip modelling project for different land-uses as well as studying how sensitive people would be to transport costs. Another study done was looking at how vulnerable people were in terms of walking and making necessary adjustments to the routes. The local authority representatives added that the MyCiTi transport command centre, which is still in use, gave people a voice by allowing them to propose new bus stops or route extensions, allowing the requirements and demands of the populace to be met. For instance, The Bus-Stop Harry Alexander, which is 1, 3 km from Witsand was a suggestion that was made by the people of Witsand. This saw the BRT service developing different services for the people such as feeder services, trunk routes, and express routes and having universal infrastructure like ramps for the disabled.

4.8.2 Accessibility impact

The city authority representatives stated that MyCiTi has improved accessibility to employment opportunities for the residents of Witsand in several ways. One of such ways is providing transport services throughout the day (that is, the MyCiTi headways are spread throughout the day), which enables the residents to look for job opportunities anytime during the day. This is beneficial to the non-employed as it helps them to travel off peak, at more affordable prices and enable them to use less transport costs as they search for jobs. In addition, this transport facility enables them to work different shifts at work and be able to access the transport services till 10 pm at night. From observations, the researcher observed that MyCiTi is the only public transport system that can provide late-night services as the last bus from Table-view leaves at 10:45pm. Sibanye golden arrow bus services offer services to its last bus at 7.15 pm from City centre and minibus taxis stop operating at 8pm in the evening. Thus, only MyCiTi can provide transport services late at night and after 11pm residents must arrange their own transport, usually done by carpooling together especially those that work in the entertainment industry.

In addition, the city authorities stated that the frequency and service dimension of MyCiTi services provides a platform for the residents to actively look for work at affordable costs especially at off-peak periods. This augments the notion noted in chapter 2 that "the cost of looking for work in Cape Town is lower than in other South African cities because of the integrated public transportation infrastructure, particularly MyCiTi, which is working efficiently to create an environment that allows those who are unemployed to sustainably search for active jobs" (City of Cape Town, 2016, p. 50).

According to the city authorities there has been growth in the northern corridor after the development of MyCiTi in terms of residential activities and commercial (retail) activities that have become potential areas of employment for the residents of Witsand. In addition, MyCiTi routes provide direct services or routes to these areas such as Century city, Woodstock, Melkbosstrand, Parklands and the Blouberg area. As noted under section 4.7 these zones are some of the main areas that hire the residents of Witsand for different jobs. In addition, the authorities noted that there is going to be potential growth in local employment through the Atlantis Special Economic Zone as they are encouraging the establishment of companies that are based on using efficient energies like solar geysers projects.

The city authorities stated that the development of MyCiTi is a movement towards creating a TOD city. The city under the Built Environment Performance Plan (BEEP) aims to reduce urban sprawl, by encouraging densification and intensification of the built environment, and integrate the public transportation network to promote commercial development and employment creation for the city. Through the development of MyCiTi access to the CBD for settlements in the northern area like Witsand have increased and has created opportunities for business development near BRT bus stations as well as growth toward Century City.

In addition, MyCiTi provides reliable services, and this improves accessibility to employment opportunities. The authorities argue that this is because it brings about predictable services to the customers that enables them to plan their journeys beforehand and be able to arrive at their employment areas or potential job interviews on time.

4.8.3 Challenges faced.

One of the challenges that Witsand faces is that they have no direct MyCiTi bus services that operate within the community and thus they are compelled to go far to reach a bus stop that is outside the community, near the main road (Neil hare Bus stop) or access one at the main road (Charel Uys South bus stop), shown in figure 25. The municipality argue that the lack of direct service is caused by local minibus taxi associations, who forbid MyCiTi services from operating within Witsand. Being able to convince the taxi operators to operate as one and act as feeder services to MyCiTi has been one of the biggest challenges for the city. The relationship between minibus taxi operators and bus service providers in Witsand has been a highly volatile one. There have been several demonstrations by minibus taxi drivers along Sibanye routes by 7/11 shops that has on certain occasions stopped the operations of the Sibanye bus service for several days or

forcing the bus to change routes. Regarding the BRT, the MyCiTi infrastructure that had been installed before MyCiTi was discontinued to operate in the area are now inactive and have gradually worn out, shown in figure 37.



Figure 37: Idle MyCiTi bus stop infrastructure within Witsand

Source; Research Observations

Another challenge that the city authorities have identified that impedes accessibility to employment opportunities in the area is the cost of travel. They argue that most of the residents from low-income residential areas like Khayelitsha, Dunoon and Atlantis find the cost of MyCiTi to be high and unfortunately this is a factor that is not easy to deal with. This is because the capital costs to implement MyCiTi were higher than the initial costs they had anticipated. In addition, the operating costs for the service are higher than what had been anticipated. They mentioned that initially MyCiTi intended to operate like the Bogota and Curitiba BRT that could run without government subsidies. But unfortunately for the City of Cape Town they have been only able to

get back 50% of their development costs and the municipality is the one responsible for the operating costs. The BRT operates on a gross costs contract whereby the bus is paid based on providing the service over a kilometre they travel. Thus, the city must pay the bus services even if they travel without customers in the bus. Thus, as a result, the municipality must subsidize the bus. Unlike the Sibanye golden arrow buses that operate on a net cost contract whereby the bus gets the revenue from the tickets and if they lose customers, they also lose the revenue.

The city states that one of the biggest challenges they face is bringing effective transport solutions to areas located at the city boundaries. This is because they inherited an unequal spatial city structure that has segregated low-income citizens from job centres thus creating long travel distances. Thus, being able to create effective solutions will still be hindered by long travel distances that the residents will have to face to reach different land uses or destinations.

The city has also identified the lack of funding to increase and further develop the network of the BRT in the area. In addition, they noted that it would be cumbersome to bring changes to the system if there is growth in the area.

4.8.4 Way forward

In terms of proffering a way forward, the city authorities pointed out that the city is still working with the Minibus Associations in Witsand to bring the MyCiTi services near to the residents of Witsand. They have identified the need to bring the bus stops closer to the residents as the area is high in crime and that most of the residents get up early to go to their various areas of employment and that others work at night and must travel back at home at night. Thus, safety concerns in the area have brought the need to open talks to bring the services to work within the community.

The city authorities also seek to implement the Integrated Public Transport Plan that ensures that there is integration of the MyCiTi BRT with the train, Sibanye, and minibus routes so that they operate seamlessly as one or to complement each other to serve current and future transport needs for all. The plan will also include integrated ticketing fares system that ensures ticketing has a seamless flow for the whole public transport route for the residents. The city seeks also to implement the blue dot system throughout the city, a system that ensures accountability and tracking of minibus taxis to reduce dangerous driving and enhance the safety of the passengers. However, they argue that there are several challenges that impede achieving such an objective and this includes having different ownerships to the different public transport modes. This is because MyCiTi is operated by the city council, the train by the state and minibus taxis by associations in the private sector. In addition, the railway services are still facing major challenges from vandalism and theft as thieves steal copper from the rails that makes recovering of the system longer. Furthermore, there are disagreements between the city and the people, strikes by the public, and vandals who target the railway system, making it a dangerous mass transit mode.

Another strategy that the city seeks to employ to increase accessibility within the Witsand and other low-income residential areas is to embark on a study on understanding the nature of jobs that

the residents will be employed at or competing for. This study will inform the type of services MyCiTi should provide to get the residents to and from such areas as Witsand. The city also seeks to increase the duration of MyCiTi services in the evening after 10pm to increase accessibility for those that work in the entertainment and hospitality industry like restaurants depending on the results of the study.

In the mean while before the authorities can bring the services closer to the community, the representatives from the city authorities stated that in the short term they will try and encourage the use of the "walking bus" concept. This is whereby residents walk as a group to increase their safety levels. The program can be implemented by coordinating a computer group where people are able to coordinate their movements and encourage people with similar activities to walk together to the MyCiTi interchange or bus stop. Security personnel stationed there can keep an eye on the bus stop or interchange, especially at 5am in the morning when most locals and students are en route to work or school.

In terms of affordability the city seeks to reduce the cost of buying the MyCiTi card and embark on an awareness outreach program that will seek to make the residents understand the fare structure of the BRT system. This they argued would increase the loading options for the residents at MyCiTi bus stations and make ticketing more accessible.

4.9 Discussion of the findings

This part provides a robust argument and debate over what literature says with regards to accessibility issues versus what the empirical data says. Prior to the development of MyCiTi, Witsand suffered from transport related social exclusion due to physical isolation and poor mass transit services. The community suffered from isolation and was excluded from the socioeconomic activities of the city including isolation from job opportunities around the city. As such the residents were forced to rely on local employment which fostered the development of informal sector employment as the high transport costs would deter them from accepting job opportunities within long distances of travel. Thus, the development of MyCiTi was done as a response to such issues. The BRT was a solution that seeks to improve accessibility in the area, thus improving social inclusion for the residents. Therefore, the focus of this dissertation was to investigate the influence of MyCiTi on accessibility to employment areas for the residents of Witsand by analysing the travel behaviour of the residents before and after the implementation of MyCiTi. The findings were structured in five themes, transport-time and distance, travel-costs, travel experience, employment opportunities and the perspective of the authorities on accessibility issues. These themes were drawn from literature as indicators of accessibility and "the transport related social exclusion theory" as shown in figure 1. This is because the theory borders around accessibility and the indicators measure inclusion and exclusion of settlements. As such, template analysis or flexible pattern matching was used to draw the themes as they are based on theory and literature but also modified based on the empirical data.

4.9.1 Travel time and distance

Grengs et al. (2013) state that accessibility is effective if mass transit is provided at a reasonable walking distance and time. Milakis et al. (2015) notes that the acceptable travel time to work for most people was between 18 minutes (ideal) and 43 minutes (acceptable) before the tolerance levels of people decreased. One of the issues identified by the respondents that affect accessibility to employment opportunities is the issue of travel time. The study shows that most of the respondents both before and after the development of MyCiTi, spend more than 1 hour to 1 hour 30 minutes for their whole trip to and from work and others spend more than 2 hours. Gobind (2018) argues that this level of travel is unacceptable as it causes “the commuters to suffer from anxiety as daily commuting requires increased effort on the part of the commuter, thus causing physical and emotional stress on them”. This over time will impact the work performance of the commuters, and their level of attention at work. as they tend to have prominent levels of absenteeism and being late comers (Gobind, 2018). Most employers discriminate against workers with long travel distances as they prefer not to employ workers that reside far from workplaces. Phillips (2020) states that employers indirectly discriminate against applicants with distant travel distances.

As noted in literature, total travel time is a combination of several components that include walking time to the bus stop, waiting time at the bus stop, in-vehicle time, transfer time that includes, walk time, and transfer time and lastly egress time (Soczowka et al., 2021). Another factor identified from the study that increases the travel time for the respondents are waiting times at interchanges. Some of the residents noted that they spent between 15 to 20 minutes while others spent more than 21 to 40 minutes depending on which travel mode they are interchanging to. Chengula and Kombe (2017) argue that the reasonable waiting time for buses should be between 10 minutes to 15 minutes. Whereas, Arhin et al. (2019) states that the recommended time is 5 to 10 minutes. Therefore, this waiting time is considered unreasonable as they waste a lot of their time waiting for transport instead of being productive at work. Another factor that increases the travel time for MyCiTi are the multiple stops the buses undergo as they pick more passengers during a journey.

The walking distance to the closest bus station is one element that lengthens residents' commute. Grengs et al. (2013) argues that to avoid the first mile problem, bus stops must be provided within reasonable distances for the residents. The longer the walking distance, the bigger the first mile problem and this reduces accessibility as the comfort to travel is decreased causing spatial inaccessibility, (Kåresdotter et al., 2022). This reasonable amount, according to the CSIR (2000) is when "the walking distance to the nearest bus stop should not be more than 400 m from the furthest house which is about 5 to 8 minutes walking distance". However, for the residents of Witsand the average walking distance for most of the respondents is between 11 to 15 minutes. Observations from the study show that the first MyCiTi bus stop provided is situated close to the industrial zone, roughly 1.3 kilometres as from the nearest house in the community. Other residents would walk more than 30 minutes to the second bus stop. Some of the respondents noted the need

for MyCiTi to start operating within the community to reduce the distance they must walk to reach the first MyCiTi stop.

Therefore, when it comes to travel time and distance, MyCiTi BRT has resulted in little or no change, meaning that there has been no improvement in this component of the accessibility measure. This is arguably because of the major challenge identified from the empirical findings, that the city has an unequal spatial city structure. Such an urban form has segregated low-income citizens from job centres thus creating long travel distances. This was identified by Turok (2001) to make it hard for City of Cape Town to develop an effective and viable public transportation system. Another problem posed by the city's physical organization is that transportation routes are radial in design, meaning that all transport routes are connected to a single centralised point which is the civic centre of Cape Town. Allansson and Kajander (2017) state that this forces people to travel longer distances to reach various destinations because they are required to pass through the CBD to get to different areas when they are using public transportation. Additionally, employment densities differ greatly depending on income levels, with larger concentrations in high-income areas. In Cape Town, the CBD, or civic centre, and the southern part of the city serve as the main hub or focal point for most economic operations. As such low-income areas located at the city periphery are still forced to travel long distances to reach areas that have more economic activity.

However, a decrease in travel time for journeys to and from work were highlighted by some of the respondents. This may arguably be due to travelling using the express buses of MyCiTi, that travel from the Civic Centre to Witsand with only a few stops along the way notably at Woodstock, Table View and Melkbosstrand and the final stop at Atlantis center and vis versa. This is coupled with MyCiTi having dedicated lanes, which excludes it from experiencing congestion. This can also be attributed to the residents being employed in decentralized economic nodes like Century city and Table View that have shorter travel distances than having to take the long trip to the CBD.

4.9.2 Travel costs or affordability

Geurs and Ritsema (2001) state that monetary constraints is a major root exclusion as it leads to deprived involvement in transport activities that connects them to socioeconomic activities. Rodrigue (2020) states that if transports costs rise by ten percent, this will reduce the volume of transport by twenty percent. The Social Exclusion Unit (2003) states that "people should be able to get needed public transport services at a reasonable cost". Behrens and Venter (2005) state that the "government has stipulated in various policies like in the White Paper on National Transport Policy of 1996 and the National Land Transport Strategic Framework that households in South Africa should not spend more than 10% of their income on public transport". The study shows that MyCiTi has reduced the travel expenses for the people of Witsand. The empirical findings shows that most of the respondents earn below R5001 making the need to save on transport costs important as the area has an average of five people per household that translates to more responsibilities and more household expenditure. After MyCiTi commenced in the area, the study shows that 70% of the respondents became users of the BRT. Most of the responded stated that

such a move was because the BRT reduced their cost of travel. This is mainly because the residents reside far from the city and as such incur high transport costs and thus, they always focus on reducing their travel costs ahead of any other travel element. MyCiTi was noted to be the cheapest of all available public transportation modes of travel operating from Witsand for both peak and off-peak periods. This was followed by Sibanye and then followed by minibus taxis being the most expensive mode of travel.

This study also shows that the BRT has reduced travel costs for the residents thus enabling them to save and use the money towards improving their welfare. Comments from the respondents over the cost of MyCiTi, notes the role of the BRT services as being cheap and more affordable than other public transport modes. Some noted that they can afford the costs and still be able to make significant savings. Therefore, MyCiTi's pricing is affordable enabling the residents to work in areas they could not work in prior to the development of the BRT. Others argued that when contrasted with minibus taxis and Sibanye, the cheaper off-peak pricing of MyCiTi also enabled the residents to travel whenever they wanted.

However, other respondents stated that the costs were high for them as they were still unemployed and job searching. As literature noted what further affects travel costs are household sizes. Lucas (2011) states that higher household sizes further increase transport costs as there will be more people to travel within a household of low-income families. While others noted that the costs are cheaper for one person as an individual travelling within a household, the cost would sky-rocket when the whole household would consider travelling, that is the parents and children together. The study shows that Witsand has a higher household size of five people, thus increasing transport costs. Some of the residents argued that they were paid on a weekly basis and were not able to purchase monthly MyCiTi fares that are cheaper. Thus, they are forced to purchase daily tickets that are more costly.

4.9.3 Travel experience or effort

Grengs et al. (2013) argue that mass transit should be safe and reliable. In terms of reliability, Engels and Liu (2011) argue that public transport that is less frequent is not reliable and thus restricts access to transport activities for the passengers. The empirical findings show that MyCiTi is reliable and safe. The BRT system has reliable bus schedules making it easier for the residents to plan their journeys. The buses run on time schedules that are precise enabling them to schedule their timetables efficiently as the buses are always on time. This has therefore, enabled the residents to have several jobs as they are able to efficiently plan their work schedule with flexibility.

Dziekhan and Kottenhoff (2007) maintain that if the public transport system has poor information systems that can cause the pedestrians to be isolated as it affects their ability to plan for their journeys freely. Findings show that the BRT system has an efficient information system that enables the residents to check the bus schedule and plan their journeys accordingly. Also, the bus stations are equipped with information desks that provide different information of different routes

for the commuters thus improving their accessibility to different job opportunities and areas of activity. In addition, MyCiTi can connect the residents to areas around Cape Town with less hustle or less burden of interchanging while using other public transport modes.

In terms of safety and security, Currie and Delbosc (2010) and Delbosc and Currie (2011) note that social exclusion is worsened if the residents within the community feel unsafe when travelling. The respondents noted that the BRT services are much safer than other modes of travel. They argue that the bus stations are equipped with security cameras and patrons are provided with security while waiting at the stations.

However, as noted, the first bus stop that is operational for the residents of Witsand is located 1.3km from the community. The level of safety and security along that route is low as several muggings and theft have occurred in the area. What has made the situation worse is that the roads leading to the bus stops have no streetlights and dedicated footpaths forcing the residents to use the road reserve along the road. To counteract this problem, most of the residents especially women have resorted to walking in groups both in the morning and evening after work to improve their safety levels. While some of the men have resorted to walking with weapons like a catapult, knobkerries for defence in case they are attacked on their way to their various bus stops. However, this cannot be maintained always as a uniform travel schedule for the group cannot be always maintained.

4.9.4 Employment opportunities

According to the study findings, there has been a spatial expansion of the citizens' employment areas since the development of MyCiTi. As the BRT has opened direct links or routes to various job locations in Cape Town. Current travel patterns show that most respondents now work in Cape Town which is the main economic hub of Western Cape Province. This is followed by Atlantis where local employment is still key towards creating job opportunities. However, important to note is that there are local industries that have closed in the area and have resulted in the loss of jobs for some of the residents. For example, Today's Frozen Foods a brunch of Heinz foods closed its brunch in Atlantis mid-year of 2022 and Takata Corporation that closed in 2021, (Appendix 4).

Sub-regional economic hubs of Cape Town such as Century city and Table view also act as powerful areas of employment. Melkbosstrand, Milnerton, Parklands and Table view remain as key areas of employment for the residents of Witsand both before and after the development of MyCiTi as they are located within reasonable distance. The study also shows that the areas of employment for the respondents has increased to include areas that are located more than 50km from Witsand and these include areas such as Hout Bay, Constantia, and Brackenfell.

The findings show there has been a spatial growth in employment areas that are open for the community. Before MyCiTi started to operate in the area, most of the residents restricted their employment areas to local employment opportunities like Atlantis centre, Atlantis industrial and Witsand. This shows that the residents suffered from social exclusion because they were forced to

be employed in low level of skill jobs that were below their qualifications as the alternative would mean incurring high transport costs if they travelled to employment areas with long travel distances. Most were also employed in affluent areas like Melkbosstrand, Dunoon, Parklands and Table View that are located within reasonable distances from the study area however, most worked as cleaners in shopping malls, being waiters and servers in restaurants and being house cleaners in affluent suburbs.

In addition, prior to the development of MyCiTi most of the residents used minibus taxis and Sibanye as their main mode of travel and these have been noted to charge higher fares during peak travel hours. The research also reveals that many respondents were forced to pass up work opportunities that required extensive travel because of the expense and the stress and damage associated with such travel. In addition, others had to lie about their home addresses for example use an address from Table View to increase their chances of being employed. Literature shows that this is because most employers indirectly discriminate against workers with long travel distances as they do not like to employ workers that reside far from workplaces, (Phillips, 2020). This further shows the level of social exclusion the residents faced prior the development of MyCiTi.

4.9.5 City of Cape Town perspectives

The study shows that the Municipality planning has evolved and changed towards working to reduce low-income households' "social exclusion" through increasing their "access" to resources, social and economic activities by integrating land use and transportation planning. They have developed policies like "the Cape Town Spatial Development Framework (CTSDF) that aims at providing more equitable access to job opportunities by lowering travel distances to economic activities and ensuring that development occurs along activity corridors and nodes. They have also developed the Integrated Transport Plan (ITP) that is aimed at creating a public transportation system that is affordable for low-income households.

The city has also developed an IPTN plan 2032 that focuses on transforming the city into a Transport Oriented Development (TOD) environment by emphasizing land use development along key railway and bus stations and their precincts to boost property values. According to city of Cape Town representatives there has been growth along the northern corridor in terms of residential and commercial activities. This is supported by literature by Moyo et al. (2021) and Moyo (2019) who state that manufacturing services have grown in some northern locations between 2010 and 2030, but zonal accessibility has remained low due to a lack of industry's growth.

The city authority representatives argue that MyCiTi has improved accessibility to employment opportunities for the residents of Witsand by providing transport services throughout the day and enables them to work different shifts at work and be able to access the transport services till 10 pm at night. In addition, they stated that the frequency and service dimension of MyCiTi services provides a platform for the residents to actively look for work at affordable costs especially at off-peak periods. This augments the notion noted in chapter 2 that "the cost of looking for work in

Cape Town is lower than in other South African cities because of the integrated public transportation infrastructure, particularly MyCiTi, which is working efficiently to create an environment that allows those who are unemployed to sustainably search for active jobs" (City of Cape Town, 2016, p. 50). Furthermore, they argue that MyCiTi provides reliable services to the public and this improves access to employment opportunities, (City of Cape Town, 2016). The city authorities argue that this is because it brings about predictable services to the customers that enables them to plan their journeys beforehand and be able to arrive at their employment areas or potential job interviews on time.

However, the city authorities agree that Witsand still faces several accessibility challenges and one of them is that the area has no direct MyCiTi bus services that operate within the community and thus they are compelled to go far to reach a bus stop that is outside the community. They state that the lack of a direct service is caused by local minibus taxi associations, who forbid MyCiTi services from operating within Witsand causing the MyCiTi infrastructure in the area to be inactive and worn out. Another challenge faced by the council are the high capital costs to implement MyCiTi and their high operating costs. This, as a result has forced the city to subsidize the BRT.

Therefore, the City of Cape Town authorities seek to one day work with the Minibus associations in Witsand to bring the MyCiTi services near to the residents of Witsand. They have identified the need to bring the bus stops closer to the residents as the area is high in crime and that most of the residents get up early to get to their employment areas and that others work at night and must travel back at home at night. Thus, safety concerns within the area have brought the need to open talks to bring the services to work within the community.

In addition, City of Cape Town also seeks to implement the IPT Plan that ensures that there is integration of the MyCiTi BRT with the train, Sibanye, and minibus routes so that they operate seamlessly as one or to complement each other to serve current and future transport needs for all. The plan will also include an integrated ticketing fare system that ensures ticketing has a seamless flow for the whole public transport route for the residents. Furthermore, before the authorities can bring the services closer to the community, the city authorities stated that in the short term they will try and encourage the use of the "walking bus" concept. This is whereby residents walk as a group to increase their safety in numbers.

4.10 Conclusion

In conclusion, this chapter provided a summary of the key findings from the field and analysed the data to provide helpful information in response to the research goals and objectives outlined in Chapter 1. It made use of figures and tables to make the findings easier to comprehend. Additionally, it included an in-depth analysis of what the literature says about accessibility concerns versus what the empirical data showed. The study shows that when it comes to travel time and distance, MyCiTi BRT has resulted in no change, meaning that there has been no improvement in this component of accessibility measure. This is arguably because of the unequal spatial city structure of Cape Town that has segregated low-income citizens from job centres thus

creating long travelling distances. This as a result makes it difficult for City of Cape Town to develop an effective and viable public transportation system.

In terms of transport costs or affordability, the study shows that the BRT has reduced the travel costs for the residents thus enabling them to save and use the money towards improving their welfare. Comments from the respondents over the cost of MyCiTi, notes the role of the BRT services as being cheap and more affordable than other public transport modes. Some noted that they can afford the costs and still be able to make significant savings. Therefore, MyCiTi's pricing is affordable enabling the residents to work in areas they could not work in prior to the development of the BRT. Others argued that compared to other modes of public transport like Sibanye and minibus taxis, MyCiTi is cheaper especially during peak hours or if bought monthly. The cheaper off-peak pricing of MyCiTi also enables the residents to travel whenever they want.

In terms of travel experience or effort, the study shows that MyCiTi is reliable and safe. The residents argue that the system has reliable bus schedules making it easier to plan their journeys. The buses run on time schedules that are precise enabling them to schedule their timetables efficiently. The respondents also noted that the BRT services are much safer than other modes of travel. They argue that the bus stations are equipped with security cameras and patrons are provided with a security assurance while waiting at the stations. In addition, the stations are sheltered thus providing a roof from extreme weather elements and exposure to public theft.

In terms of employment opportunities, MyCiTi has resulted in a spatial expansion of employment opportunities within the City of Cape Town. The BRT has opened direct links or routes to various job locations in Cape Town. Current travel patterns show that most respondents now work in Cape Town which is the main economic hub of Cape Town. This is followed by Atlantis which shows that local employment is still key towards creating job opportunities. Sub-regional economic hubs of Cape Town such as Century city and Table view also act as powerful areas of employment. Melkbosstrand, Milnerton, Parklands and Table View remain as key areas of employment for the residents of Witsand both before and after the development of MyCiTi as they are located within reasonable travelling distance.

The study also shows that the areas of employment for the respondents has increased to include areas that are located more than 50km from Witsand and these include areas such as Hout Bay, Constantia, and Brackenfell. In terms of City of Cape Town perspectives, the study shows that the Municipality planning has evolved and changed towards working to reduce low-income households' "social exclusion" through increasing their "access" to resources, social and economic activities by integrating land use and transportation planning. They have developed policies like "the Cape Town Spatial Development Framework (CTSDF) that aims at providing more equitable access to job opportunities by lowering travel distances to economic activities and ensuring that development occurs along activity corridors and nodes. They have also developed the Integrated Transport Plan (ITP) that aims at creating a public transportation system that is affordable for low-income households.

Chapter 5: Conclusion and Recommendations

5.1 Introduction

The previous chapter looked at the summary of the key findings from the field and analysed the data. It also provided a robust detailed discussion over what literature says over accessibility issues versus what the empirical data says. The empirical data shows that MyCiTi BRT has brought no change, in terms of travel time and distance, a component of accessibility measure. Whereas, in terms of transport costs the BRT has reduced the travel costs for the residents and being a more cost-effective mode of travel compared to other public transport modes. In terms of travel experience MyCiTi is reliable and safe. MyCiTi has increased the spatial expansion of employment opportunities in Cape Town available to the residents by providing direct routes to the job locations such as Cape Town civic centre, Century city and Table view. The Municipality planning is now more focused on integrating land use and transportation planning and improving social inclusion of low-income settlements in the city.

The current chapter brings the study to a close by delving into the major concerns that emerged from the research and providing a summary of the findings. It revisited the research objectives and reviewed them against the research findings. Thereafter, the research proposition was either accepted or disproved based on the discussion. It will also make recommendations for future studies.

5.2 Revisiting the research question.

The research question for the study was:

How has the BRT influenced accessibility to employment opportunities for the residents on the outskirts of Cape Town?

The research was a pattern matching exercise that relied on the themes that were identified in the literature review within the transport related social exclusion theory in order to assess and answer the research question. Furthermore, this framework suggested the following measures of accessibility, and these include travel cost, travel time, travel mode and experience. Other aspects that were considered were the employment opportunities available for the residents and the perspectives of the city of Cape Town authorities.

5.3. Revisiting the Research Objectives

This section revisits the study objectives and how they were met by the study findings.

5.3.1 Objective 1

The first objective of the study was to explore the characteristics of Witsand as a peripheral community at the periphery of greater Cape Town. The study showed that Witsand is a settlement

located 40km from Cape Town Civic Centre making it a peripheral area within Cape Town. The community faced space exclusion in that, the area had no direct public transport services linking them to the city centre. They had no train services and had to rely on minibus taxis that connected them to Dunoon and from there interconnect to different areas of employment. As such they also suffered from economic exclusion because they had to pay higher fares as minibus fares charge higher costs than conventional buses. The geographical location of the area makes it unavoidable or inevitable for, the residents to travel long distances to and from work and as a result face time-based exclusion where they spend significant amounts of their time traveling. Consequently, transport based social exclusion, most of the residents were employed in the informal sector and work locally. Therefore, the objective was achieved because the literature and the findings both showed that the community is a peripheral settlement.

5.3.2 Objective 2

The second objective of the study was to identify the factors that contribute to the transportation and land-use-related challenges to access employment opportunities. One of the issues highlighted by the study was that residents had to travel significant distances to go to places of work. As a result, they spend most of their productive time traveling to and from work. As a result, they were unable to participate effectively in other social activities in the city. The findings also revealed that some of the residents had to turn down work opportunities located far away from the settlement due to long travel distances. This was due to high transport costs the residents would have to pay and that the time spent traveling would negate the benefits of earning a wage as most of their incomes would be spent mainly on transportation. In addition, the long trips would exert anxiety and stress on the residents thus reducing their productivity at work. However, what has further increased the travel time for the residents include the time they have to interchange to other modes and the various stops the buses must make as the drop passengers.

Therefore, the objective was achieved as the study pointed out the transportation and land-use-related challenges to access employment opportunities for the residents of Witsand.

5.3.3 Objective 3

The third objective of the study was to assess how the BRT has improved accessibility to employment prospects for the residents of Witsand. The study shows that, the BRT has provided people with possibilities to access jobs in the CBD and other sub-nodes of the city, such as Century City, because the routes take inhabitants straight to these nodes without requiring them to change buses. MyCiTi fares are more affordable than those of other modes of transportation such as Sibanye and minibus taxis, and this has arguably enabled the residents to travel more, to areas of employment and even have multiple jobs. Furthermore, the empirical findings show that MyCiTi is reliable and safe as the system has reliable bus schedules making it easier to plan their journeys and be more flexible. The findings further suggest that there has been growth along the northern corridor in terms of residential and commercial activities, which is also supported by literature.

Therefore, the objective was achieved as the study showed that there have been improvements towards access to employment opportunities for the residents of Witsand.

5.3.4 Objective 4

The fourth and last objective of the study was to examine the spatial distribution of job prospects available to residents of Witsand from the CBD and other decentralized nodes in the surrounding areas. According to the findings, MyCiTi has increased the spatial distribution of areas of employment open to the residents. Before MyCiTi started to operate in the area, most of the residents restricted their employment areas to local employment opportunities like Atlantis centre, Atlantis industrial and Witsand. This shows the residents suffered from social exclusion because they were forced to source employment in low level of skill jobs that were below their qualifications as the alternative would mean incurring high transport costs if they travelled to employment areas within long travel distances. Currently, most of the residents' now work in the CBD and other decentralized nodes such as Century City and Table View, which have direct MyCiTi routes. Residents also work in regions outside of the CBD, such as Camps Bay, Hout Bay, Mowbray, and Rondebosch. Some inhabitants work in the local area where mostly informal jobs are done, such as selling vegetables and clothes at the local market, while others work in Atlantis' industries and supermarkets.

This objective was therefore, achieved as the study shows the different decentralized areas that the residents of Witsand are now currently employed at.

5.4 Review of the research proposition.

The research proposition for the research was:

With the establishment of the BRT system, job opportunities became more accessible to residents of Witsand, Cape Town.

Therefore, the research proposition sort to establish if the implementation of the BRT system MyCiTi, has resulted in job opportunities becoming more accessible to residents of Witsand. Accessibility is the ease of reaching areas of employment, the cost of transportation as well as the time factor. The objectives were set to guide the study towards answering the research question. The data findings demonstrate a spatial improvement towards work opportunities for the residents. Examples of such is the growth of commercial activities especially the retail sector in areas such as Century city, Blouberg and Table view.

The geographic reach of the residents has expanded as a result of the development of MyCiTi by providing direct routes to various locations in Cape Town such as the Civic Centre, Rondebosch, Sea Point, and Hout Bay. Additionally, because MyCiTi is substantially less expensive than other public transportation options in the area, the BRT has increased the residents' ability to afford public transportation. The study also shows that MyCiTi is dependable and safe. However, in terms of travel time and distance, the study shows that there are no changes from before MyCiTi was

developed, in this component of accessibility measure. This may arguably be attributed to the spatial structure of Cape Town which encourages long distance travel and even with dedicated lanes of the BRT system, residents of Witsand have not seen any significant changes in travel time.

There are some findings which suggest that the travel time component of accessibility has not changed much for the Witsand residents since the development of the BRT system. However, the study shows that most of the yardsticks for improved accessibility have been met by the development of MyCiTi. It may, therefore, be argued that the BRT system has largely improved the accessibility to employment opportunities for the residents of Witsand. The proposition is therefore, accepted.

5.5 Areas for further research

1. The research for the study focuses on transport related social exclusion. There are also other factors at play such as education, discrimination and poverty that can cause social exclusion. Therefore, it is recommended that further research on these and related issues should be carried out.
2. The study is a case-based study of Witsand informal settlement in Cape Town and thus the results are specific to the area. To show a clear indication if MyCiTi has an impact to accessibility to employment areas for low-income settlements, this research can be done to different low-income areas around Cape Town.
3. The study has shown that MyCiTi has not affected with any change in terms of transport time and distance. Thus, future research is needed to identify measures that can improve accessibility in such areas and reduce the travel time and distance that the residents must endure daily.
4. Future research can study if there is a correlation between the level of education of residents and their level of education towards improving access to employment opportunities. Literature review shows that there is a misalignment of skills and education levels with job prospects. Low-income residents must be equipped to match the skill or education levels required for the potential job. The issue is that individuals may be offered work, but they will remain unemployed if they lack the necessary qualifications.
5. Future research can look at how land use planning can be centred on densification and transit-oriented development (TOD) planning, both done along public transportation lines to improve the number of job opportunities near the people. Jennings (2015) argues that instead of providing transportation to help individuals get to different land uses, the planning should be to bring work prospects closer to the residents, thus effectively lowering travel distances and travel time.
6. The study was qualitative retrospective research that sort to have a deeper understanding of travel behaviours of the residents within the case study. Thus, future research can conduct more quantitative scientific research that will quantify the growth in job opportunities available for the residents and use more specialised geographic information

systems to show the spatial growth of employment areas attributed from the development of MyCiTi BRT system.

7. Travel costs to employment areas for the study were limited to Witsand to Cape Town route. Thus, future research can be done that will calculate travel costs to different areas of employment in Cape Town.

5.6 Conclusion

In conclusion, this chapter looked at the major concerns that emerged from the research and provided a summary of the findings. It revisited the research objectives and reviewed them against the research findings. Thereafter, the research proposition was either accepted or disapproved based on the discussion and gave recommendations for future studies. The research proposition sought to establish if the administration of the BRT system, would result in job opportunities becoming more accessible to residents of Witsand, Cape Town. The geographic reach of the residents has expanded because of the development of MyCiTi by providing direct routes to various locations in Cape Town such as Century city, Blouberg, Table view with shopping malls such as Table Bay mall, Rondebosch, Sea Point and Hout Bay. In addition, in terms of travel cost has been improved, as MyCiTi is significantly cheaper than other public transport modes. MyCiTi is dependable and safe. The BRT services are much safer than other public modes of travel with security cameras and security personnel at the stations. However, in terms of time, there are no changes from before MyCiTi was developed in this component of accessibility measure. This is because the spatial structure of Cape Town encourages long distance travel. Thus, while the findings reveal some responses which show that the travel time component of accessibility has not changed for the residents before and after the development of the BRT system. It, however, shows that most of the yardsticks that define the measure of accessibility were met. It may, therefore, be argued that the BRT system has largely improved the accessibility to employment opportunities for the residents of Witsand. The proposition is therefore, accepted.

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Appendix 1: Survey Questionnaire

Survey Questionnaire

Questionnaire number: _____

Date: ____ / ____ / 2022

WORK TRAVEL QUESTIONNAIRE

PART A: CURRENT TRAVEL

1. Sex:

1= Female 2= Male 3= Other

2. Age group:

1= 25 – 39
2= 40 – 59
3= 60+

3. How many people are in your household?

4. What is your household total monthly income?

1= No income	<input type="checkbox"/>	5= 3 001 – 4 000	<input type="checkbox"/>
2= 1 – 1 000	<input type="checkbox"/>	6= 4 001 – 5 000	<input type="checkbox"/>
3= 1 001 – 2 000	<input type="checkbox"/>	7= 5 001 and above	<input type="checkbox"/>
4= 2 001 – 3 000	<input type="checkbox"/>	8= Prefer not to answer	<input type="checkbox"/>

5. Which part of the city do you work?

6. How many days a week do you travel for work?

1= 2= 3= 4= 5= 6= 7=

7. What is the main mode of transport you use for your trips to work (the longest)?

1= MyCiTi 2= Minibus taxis 3= Golden Arrow bus
4= Walk 5= Car as passenger 6= Car as driver
7= Train 8= Other (Specify) _____

8. Why do you choose not to use other modes of travel other than the one chosen above?

1= too expensive 2= too much stress
3= not enough time to travel 4= other (specify) _____

9. How many minutes does it take you from your house to your taxi/bus/train stop?

- 1= 0-5 minutes 2= 6-10 minutes
3= 11-15 minutes 4= 15- 30 minutes
5= 31 or more minutes

10. When travelling which factor influences your choice of mode of travel the most?

- 1= travel time 5= flexibility (travel whenever you want)
2= travel costs 6= comfortability
3= security from crime 7= reliability
4= safety from accidents 8= other (specify) _____

11. For the same trip do you use other modes of transport (taxi/walking to get to the bus)?

- 1= MyCiTi 2= Minibus taxis 3= Golden Arrow bus
4= Walk 5= Car as passenger 6= Car as driver
7= Train 8= Other (Specify) _____

12. If you have used more than one taxi/bus/train to get to work: How many minutes do you have to wait in between for the next mode of transport?

- 1= 0-10 minutes 2= 11-20 minutes
3= 21-30 minutes 4= 31-40 minutes
5= 41 minutes or longer

13. How many minutes does your whole trip take?

- 1= 0-20 minutes 2= 21-40 minutes
3= 41 minutes – 1 hour 4= 1 hour – 1 hour 30 minutes
5= 1 hour 31 minutes to 2 hours 6= 2 hours and longer

PART B: PREVIOUS TRAVEL

Think back in 2013 before MyCiTi was developed and answer the following questions.

1. Is the place you used to work in 2013 the same as your current job?

1= Yes 2. = No

2. If NO, which part of the city did you work?

3. What was the main mode of transport you used then (the one that took the longest)?

1= Minibus taxis 2= Walk 3= Golden Arrow bus
4= Car as driver 5= Bicycle 6= Car as passenger
7= Train 8= Don't remember 9= Other (Specify)

4. For the same trip did you use other modes of transport (for example: walking or using a taxi to get to the bus)?

1= Minibus taxis 2= Walk 3= Golden Arrow bus
4= Car as driver 5= Bicycle 6= Car as passenger
7= Train 8= Don't remember 9= Other (Specify)

5. What was the total length of your trip to and from work combined?

1= Ours or Minutes 2 = I do not know

6. Have you rejected job offers because you had to travel long distances?

1= Yes 2= No

PART C: COMPARISON - MYCITI IMPACT

Please think about how your travel to work has changed from the time MyCiTi was not available to when it became operational in your area, from 2013 to today, and compare the differences in your travel.

1. How have the following changed, compared to 2010?

	1= Much better	2= Better	3= No change	4= Worse	5= Much worse	6= Not sure
1. Affordability	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2. Travel time	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3. Work /Job opportunities	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

2. Why did you switch to MyCiTi when it became available?

- 1= reduced travel time
- 2= reduced travel costs
- 3= security from crime
- 4= safety from accidents
- 5= flexibility (travel whenever you want)
- 6= comfortability
- 7= reliability
- 8= other (specify) _____

3. What has changed about your trip since you started using MyCiTi?

- 1= trips are shorter
- 2= cheaper
- 3= more comfortable
- 4= more safe
- 5= improved flexibility
- 6= more reliable
- 7= other (specify) _____

4. Have your travel times changed since the introduction of MyCiTi?

- 1= reduced
- 2= increased
- 3= no change

5. Has MyCiTi opened new work/job opportunities for you?

- 1= has opened more opportunities
- 2= has opened moderate opportunities
- 3= has not opened any opportunities
- 4= has potential to open opportunities
- 5= Other (specify) _____

6. To what extent Has MyCiti enabled you to access job opportunities that were far away such as the CBD or beyond?

- 1= to a great extent
- 2= to a less extent
- 3= no change
- 4= have declined

7. How has MyCiTi increased access to employment opportunities if you compare from before it was developed in terms of the following factors:

a) Travel time:

b) Transport costs:

8. Do you have any other comments you want to add about how MyCiTi has increased your access to employment opportunities?

THANK YOU FOR YOUR COOPERATION!

Appendix 2: City of Cape Town interview Guide

City of Cape Town interview Guide

Date

Department.....

Respondent's position.....

1. Has the City of Cape Town done any research to find out how the introduction of MyCiTi has improved accessibility?
2. What was your intended aim of introducing the BRT in Witsand?
3. Considering that there were challenges in assimilating the taxi operators of this community, what are your plans in making sure that the provided service is closer to the people.
4. What is the level of ridership from my city that stems from this community?
5. What factors impede access to employment that are transport related for the community?
6. Comparing my Citi to other modes of transport like Sibanye and taxis, which mode of public transport has improved the accessibility to employment opportunities for the residents of Witsand.
7. If Yes or No, on the previous question, state why:
8. Has there been an increase in the spatial distribution of employment opportunities that are accessible to them from the CBD to other decentralised nodes around it?
9. If Yes or No, on the previous question, state why:
10. What do you think can be improved on MyCiTi to improve accessibility to work opportunities for the community?
11. Why was the Blaauwberg corridor selected as the first choice of Phase 1 of implementing the BRT system.
12. What challenges does My Citi face that may hinder it to meets its objectives?
13. Do you have any other comments you want to add about how MyCiTi has increased your access to employment opportunities?
14. Multi-modal transportation is key for any successful public transportation systems, what are your plans in making sure that such a plan is achieved.
15. Security is one key aspect that deters the use of your service as people have a mile to walk to their residential area from the nearest MyCiTi-Stop. What are your plans in making sure that security is achieved within this area?
16. Were the user demands and needs of the residents considered prior its implementation.
17. If yes, what aspects were considered? And if no, why not?

THANK YOU FOR YOUR COOPERATION!!! YOUR HELP IS GREATLY APPRECIATED.

Appendix 3: Article on the establishment of Witsand settlement in Atlantis

Full story found on: <https://www.capetownmuseum.org.za/places/atlantis>



Witsand Informal settlement. Image: Peter Chadwick/Africa Media Online.

Witsand Informal Settlement

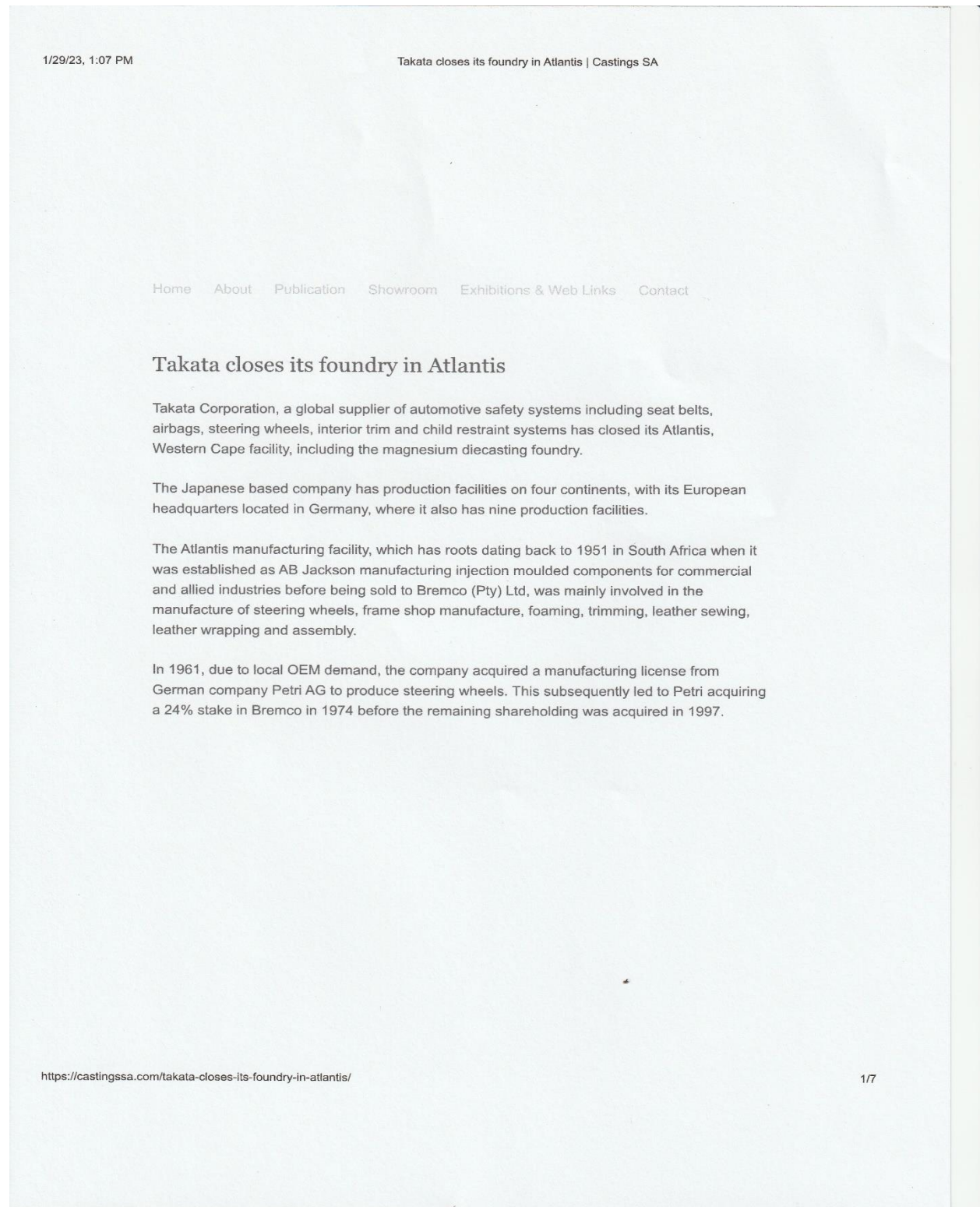
The influx of Black African migrants, largely from the Eastern Cape, led to the development of the informal settlement of Witsand on the outskirts of east Atlantis. The first dwellings were put up in the 1980s.

Due to apartheid legislation, only people designated as 'coloured' could live in Atlantis. Until 1990, Black Africans were not allowed to live in Atlantis and were only allowed to work there. Factory owners were also denied the right to apply for them to stay on the factory premises.

With time, people who were allowed to live in Atlantis, but could not afford the rent, also moved to Witsand.

Appendix 4: Closing of Tanaka Corporation

Full article found at: <https://castingssa.com/takata-closes-its-foundry-in-atlantis/>





The company name changed to Petri South Africa in 1998 and subsequently Takata Petri South Africa in 2000 when Takata purchased Petri AG.

The local operation began magnesium diecasting in the steering wheel frame production area in 2005, and final assembly of seatbelt retractors and seatbelt buckles in 2007.

The company had moved its manufacturing plant to the industrial area of Atlantis in 1990 and at the time of closure had over 300 employees. Only 20 staff took up the option of moving to the company's Durban, KwaZulu Natal operation, which was established in 2013 so that the company could be close to one of its main clients Toyota Manufacturing South Africa. This facility concentrates on the COP-Airbag testing area and driver airbag module assembly and employs 180 staff.

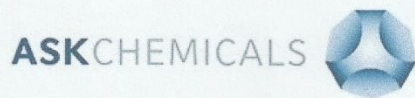
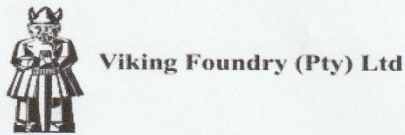
The three diecasting machines used for magnesium diecasting in the steering wheel frame production area were sent to one of the company's plants in Germany.

Takata have been in the news constantly recently. Certain types of airbag inflators manufactured by Takata were found to have a potential for moisture intrusion over time. As a result, they could be susceptible to abnormal deployment in a crash. The relationship of moisture intrusion, if any, to the risk of inflator rupture is not known. To date, worldwide no injuries or fatalities caused by this condition have been reported although thousands of vehicles have been subject to recall costing the company millions.

However in a new development, the US National Highway Traffic Safety Administration (NHTSA) also said it has begun an investigation that could yet add millions more vehicles using Takata's air bag inflators due to new reports of dangerous malfunctions.

The latest investigation could potentially expand a future recall to cover not just older vehicles but millions of newer models. And the new NHTSA probe is targeting a wider range of air bag types, including side-impact restraints, not just the frontal devices covered by the original Takata recall.

Search ...



Appendix 5: Ethics clearance form

Application for Approval of Ethics in Research (EIR) Projects
Faculty of Engineering and the Built Environment, University of Cape Town

ETHICS APPLICATION FORM

Please Note:


Any person planning to undertake research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town is required to complete this form **before** collecting or analysing data. The objective of submitting this application *prior* to embarking on research is to ensure that the highest ethical standards in research, conducted under the auspices of the EBE Faculty, are met. Please ensure that you have read, and understood the **EBE Ethics in Research Handbook** (available from the UCT EBE, Research Ethics website) prior to completing this application form: <http://www.ebe.uct.ac.za/ebe/research/ethics1>

APPLICANT'S DETAILS		
Name of principal researcher, student or external applicant		SHARON TSITSI MARIMIRA
Department		CONSTRUCTION ECONOMICS AND MANAGEMENT
Preferred email address of applicant:		MRMSHA005@myuct.ac.za
If Student	Your Degree: e.g., MSc, PhD, etc.	MSc in PROPERTY STUDIES
	Credit Value of Research: e.g., 60/120/180/360 etc.	60
	Name of Supervisor (if supervised):	MR UCHE ORDOR
If this is a research contract, indicate the source of funding/sponsorship		
Project Title		Impact of the BRT on accessibility to employment opportunities; case of Witsand, Atlantis

I hereby undertake to carry out my research in such a way that:

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

APPLICATION BY	Full name	Signature	Date
Principal Researcher/ Student/External applicant	SHARON TSITSI MARIMIRA		28/11/ 2021
SUPPORTED BY	Full name	Signature	Date
Supervisor (where applicable)	Uche Ordor		30/11/2021

APPROVED BY	Full name	Signature	Date
HOD (or delegated nominee) Final authority for all applicants who have answered NO to all questions in Section 1; and for all Undergraduate research (Including Honours).	Dr. Frank K. Ametefe		28/01/2022
Chair: Faculty EIR Committee For applicants other than undergraduate students who have answered YES to any of the questions in Section 1.			

Appendix 6: Consent form

Consent form



CONSENT TO PARTICIPATE IN RESEARCH

Impact of the BRT on accessibility to employment opportunities; Case of Witsand.

You are asked to participate in a research study conducted by Sharon Tsitsi Marimira, from the Department of Construction Economics and Management at University of Cape Town. The results of the data that will be collected here will contribute towards the fulfilment of my thesis. You were selected as a possible participant in this study because of being a resident of Witsand before MyCiTi BRT came into operation.

1. PURPOSE OF THE STUDY

The purpose of the study is to analyse the travel patterns of the people in Witsand and the influence MyCiTi has had on their travelling patterns. The study will ask questions on the current traveling activities of the respondents as well as their travelling activities 7 years ago before MyCiTi started to operate in their area.

2. PROCEDURES

If you volunteer to participate in this study, we will ask you to do the following things:

The study consists of questionnaire that will be handed to you in two ways. The questionnaire will be handed over to you to fill in the questions which are mostly close ended questions. To adhere to social distancing regulations for Covid 19, the researcher will drop the questionnaire and pick it up the next day. You can write down and indicate questions which you did not understand, and the researcher will explain the next day, or a link of the questionnaire will be sent to your phone as an online survey.

3. POTENTIAL RISKS AND DISCOMFORTS

The study has a risk of that some of the information you may have forgotten. However, you can respond to the best of your abilities as most information starts to be recollected the more you respond to the questions.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

The study helps the community be able to identify accessibility benefits of different modes of public transport in terms of cost and time as they evaluate them in the questionnaire.

5. PAYMENT FOR PARTICIPATION

There is no payment towards participation towards the study as it is done solely for academic purposes.

6. CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of keeping the identity of the respondents in anonymity to safeguard their identity. The names of the participants will remain hidden as the names of the researcher will be coded to zeros and ones representing male or female without reference to their names. The research is solely for academic purposes and will not be used for other purposes. No one will have access to the responses of the participant except the researcher and university supervisors.

7. PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you do not want to answer and remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. If you feel uncomfortable or threatened doing the research, you are allowed to withdraw without providing a reason for it.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact the principal investigator Sharon Marimira at 081 512 7197 or MRMSHA005@myuct.ac.za and the supervisor Mr. Uche Ordor at uche.ordor@myuct.ac.za

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights, or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact the principal investigator Sharon Marimira at 081 512 7197.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to me by Sharon Marimira in English/Xhosa/Shona and I am in command of this language, or it was satisfactorily translated to me. I was given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

Name of Subject/Participant

Name of Legal Representative (if applicable)

Signature of Subject/Participant or Legal Representative

Date

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____ [*name of the subject/participant*] and/or [his/her] representative _____ [*name of the representative*]. [He/she] was encouraged and given ample time to ask me any questions. This conversation was conducted in [*Afrikaans/*English/*Xhosa/*Other*] and [*no translator was used/this conversation was translated into* _____ by _____].

Signature of Investigator

Date

Appendix 7: Inter Press Service Newspaper

Tuesday, February 1, 2022

Website: <https://www.ipsnews.net/2012/10/reducing-poverty-in-south-africa-by-cutting-time-in-traffic/>



INTER PRESS SERVICE

News Agency

Reducing Poverty in South Africa by Cutting Time in Traffic

By [Gail Jennings](#)



Direct benefits of Cape Town’s MyCiTi early phase Bus Rapid Transit system is skewed in favour of middle rather than lower income residents. Credit: Gail Jennings/IPS

CAPE TOWN, South Africa, Oct 2, 2012 (IPS) - In South Africa, Bus Rapid Transit systems, which were pioneered to profound effect in Latin American countries such as Colombia and Brazil, are being promoted as potentially effective ways of delivering improved public transport services to the urban poor. But experts question whether systems such as these can alleviate poverty to any meaningful extent.

Bus Rapid Transit, sometimes referred to as “rail on road” systems, are high-quality, high-capacity bus systems with their own right-of-way, dedicated bus lanes.

Today the TransMilenio in Bogota, Colombia carries around 1.6 million passengers every day, over eighty-four kilometres of segregated busway. In Curitiba, Brazil, about 70 percent of commuters use the BRT, and around 30 percent of passengers are “converted” private car users.

It is upon purportedly transformative systems such as these that the cities of Johannesburg, Tshwane and Cape Town in South Africa, Lagos in Nigeria and Nairobi in Kenya have pinned their transport hopes and dreams.

Early phases of multi-million-dollar capital projects are operating in Johannesburg and Cape Town and are set to soon launch in at least four other cities in South Africa.

But while it is too early to draw long-term conclusions about the impact of these transport systems, several researchers are asking questions and producing some answers about their ability to contribute to national goals of alleviating poverty.

James Chakwizira, a senior researcher in the built infrastructure department at the Council for Scientific and Industrial Research (CSIR), told IPS that although these high-quality services do have enormous potential for addressing public transport challenges within communities, the current initiatives such as Johannesburg's three-year-old system, Rea Vaya, fall short of expectations.

He said because terminal infrastructure developments are located away from the marginal communities' location, people from these areas need to use a minimum of two transport modes to access and use the routes.

Councillor Rehana Moosajee, who is on the Mayoral Committee Member for Transport for the City of Johannesburg, and is a Rea Vaya champion, told IPS that initially one of the key imperatives of the Rea Vaya system was to overcome apartheid's spatial legacy and promote access and social cohesion.

"I think that now a lot more work will have to be done over a period in assessing impacts on poverty, as based on the city's own multiple deprivation indices, the areas of highest multiple deprivation are further south of Soweto – a township to the south of Johannesburg – and therefore not yet reached by the service.

"Our own experience suggests that Rea Vaya commuters are certainly saving time, though, and we have also had some interesting accounts of property availability and take-up on certain parts of routes and the creation of economic activity," she said.

At a December 2011 conference on Land Passenger Transport, Karen Lucas, an international researcher on transportation equity, supported the implementation of BRT to the extent that "these major infrastructure projects are needed to bring high quality, modern and efficient mainstream public transport services to inner cities."

However, she noted "these services will serve only a minority of the travel needs of urban populations."

Research released in July by the University of Pretoria's Christo Venter and Eunice Vaz reached a similar conclusion. Using data from a small-sample household survey conducted in Soweto, they found that the time and cost benefits of the system "accrue largely to medium-income households rather than to the poorest commuters in the area."

"To the extent that passengers can spend time and fare savings on other goods, Rea Vaya contributes to poverty reduction," they found. The researchers also noted that Rea Vaya is priced higher than the cheapest available public transport alternative, commuter rail, which remains the mode of choice for the poorest commuters.

The average travel cost for Rea Vaya users comes to R10.20 (about 1.24 dollars) per one-way trip to work, as compared to R11.70 (about 1.42 dollars) for other modes of transport like mini-bus taxis, which most people used to take before Rea Vaya.

Overall, the direct benefits of Rea Vaya are skewed in favour of middle- rather than lower-income residents, the researchers concluded. They suggested that more specific targeting was needed for the BRT to deliver significant poverty reduction benefits.

The situation is similar with the City of Cape Town's MyCiTi early phase BRT service.

African Centre of Excellence for Studies in Public and Non-motorised Transport (ACET) researchers Lorita Maunganidze and Romano Del Mistro used ACET Household Survey data to conclude that MyCiTi might not be of value to poor commuters.

“While poor commuters may benefit from more accessible, frequent and fast BRT services, ironically, these will be more expensive and, in some cases, unaffordable to them and therefore of no benefit,” the researchers said.

They recommend that the routing structure be revised and rationalised to make in-vehicle and trip distances shorter, particularly for the poor commuters who face the longest commuting distances and times; and that local BRT be tailored more specifically to work within the South African environment or under South African conditions.

Councillor Brett Herron, City of Cape Town's Mayoral Committee Member for Transport, Roads, and Stormwater told IPS that it is not possible to look at the impact of a new BRT service on poverty, or on poor communities, in isolation from the entire public transport network.

“BRT is just one mode of transport, and this mode alone cannot have expansive direct economic benefits to poor communities ... BRT trunks alone are not going to bring about the level of change we require to universally benefit the urban poor.

“We will seriously address poverty only when we piece together all the complicated components of this puzzle; public transport is one piece – with changed land use, densification, transit-orientated development, all responding to new or improved public transport corridors, we will start to bring people to opportunities and take opportunities to people.”

Pauline Froschauer, project manager for Rustenburg Rapid Transport, which is currently in the construction phase, told IPS that instead of poverty alleviation, a transport project such as a BRT should be measured against what is usually its primary objective: the effect it has on levels of mobility and accessibility.

“At best one could say that by improving mobility and accessibility, there are positive ‘externalities’, such as city development, local economic development, and poverty alleviation. But to try to measure this in one BRT corridor (such as the Soweto-CBD Rea Vaya) is, I think, misrepresentative. Until one has a reasonable network effect, improved mobility and accessibility will not be achieved.”

Appendix 8: MyCiTi routes operating from Atlantis.

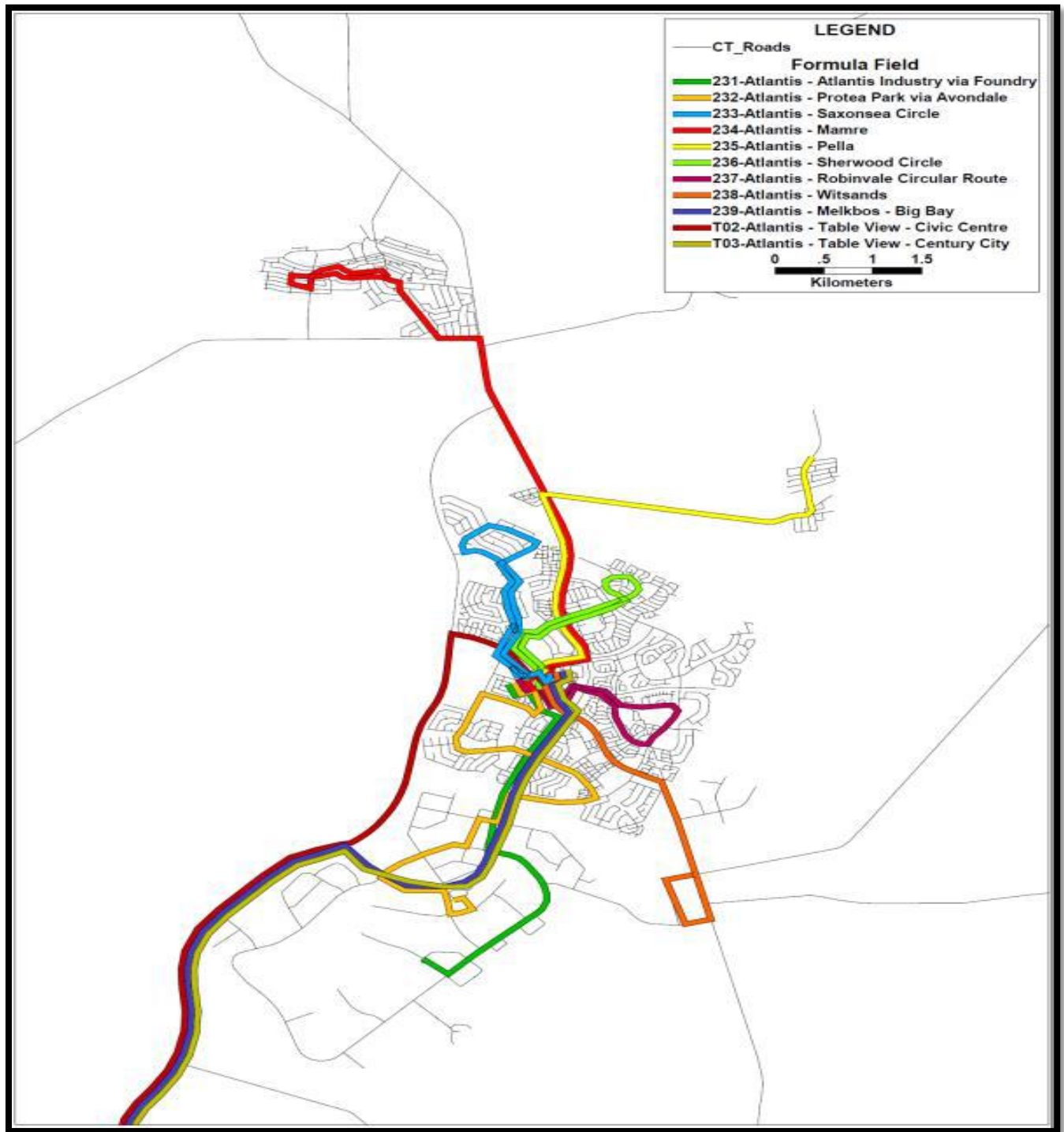


Figure 38: MyCiTi routes operating from Cape Town

Source: (Transport for Cape Town, 2015b)

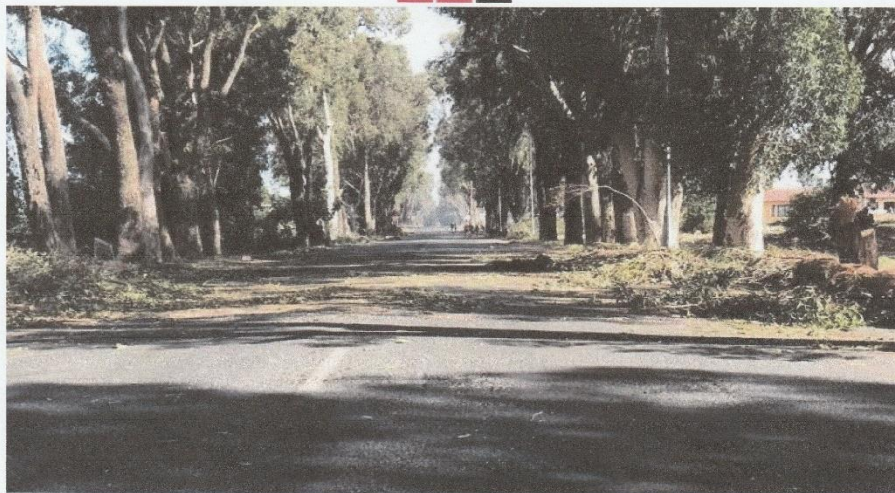
Appendix 9: Protests in Witsand over service delivery

EYEWITNESS NEWS

Website: <https://ewn.co.za/2018/10/18/witsand-leaders-all-we-want-is-community-hall/amp>

Protests in Witsand over service delivery

EYEWITNESS NEWS



WITSAND LEADERS: ALL WE WANT IS COMMUNITY HALL

Residents in the settlement just outside Atlantis have been protesting on Thursday, calling for better services like streetlights, a clinic, and a primary school.

CAPE TOWN - Witsand community leaders say all they want is a community hall in the area.

Residents in the settlement just outside Atlantis have been protesting on Thursday, calling for better services like streetlights, a clinic, and a primary school.

According to the leaders, seven people have been arrested for public violence.

Community leaders in Witsand have met with City of Cape Town officials to discuss their grievances, the main one being the need for a community hall.

One of the leaders, Luvuyo Matshisi, says they've found a donor to develop an unused municipal building in the area into a hall. But Matshisi says there have been delays since last year from the City's side to approve the building plans.

He says a hall will be the solution to many pressing needs in Witsand.

"We want to, at least, have that resource centre working as a clinic and everyday basis. Then we can have this hall to run other functions like Sassa and other community meetings and gatherings."

Police, traffic, and law enforcement officers are still monitoring the area where a few groups of residents are still gathered.